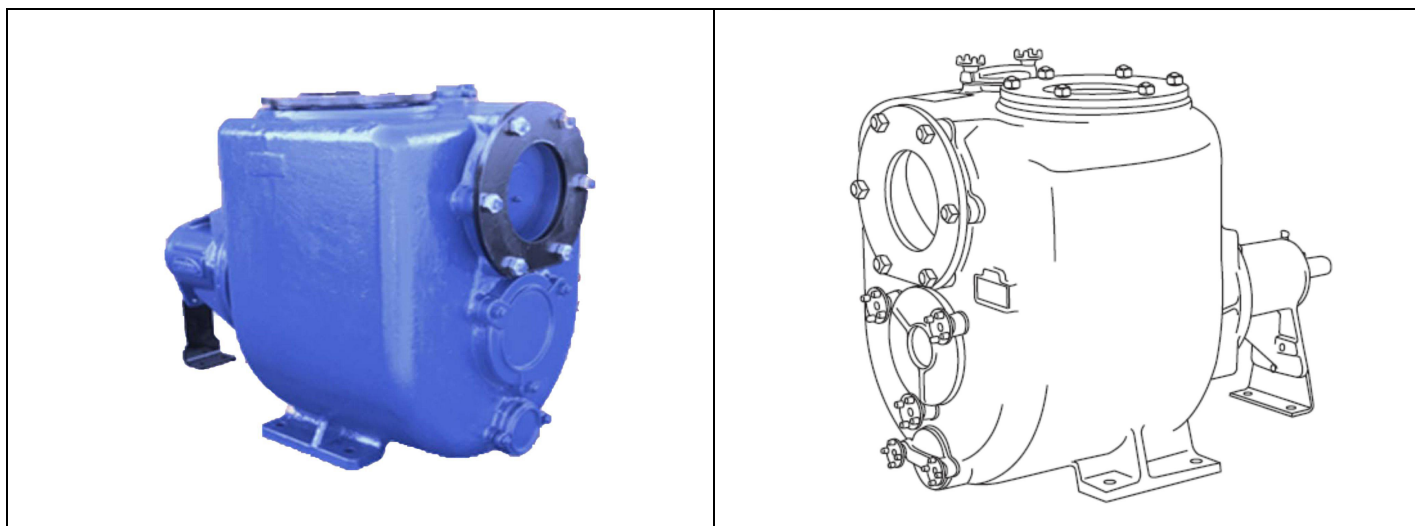




Instructions for use and maintenance



JCS-S Series

SELF PRIMING CENTRIFUGAL PUMP



WARNING

DO NOT OPERATE THE PUMP UNTIL YOU HAVE READ AND UNDERSTOOD THIS MANUAL.

JMS DECLINES ALL AND EVERY LIABILITY FOR DAMAGE DUE TO NEGLIGENCE AND FAILURE TO COMPLY WITH THE INSTRUCTIONS IN THIS MANUAL.

CADOPPI SRL WILL NOT BE LIABLE FOR DAMAGE CAUSE BY INCORRECT INTERPRETATION OF THE INSTRUCTIONS IN THIS MANUAL OR FOR DAMAGE CAUSED BY INCORRECT INSTALLATION AND/OR BY IMPROPER USE OF THE PUMP ITSELF.

1. IDENTIFICATION.....	13
2. WARRANTY.....	13
3. GENERAL INSTRUCTIONS.....	13
4. SAFETY AND ACCIDENT PREVENTION INFORMATION.....	14
5. IN CASE OF EMERGENCY	14
6. HANDLING AND TRANSPORT.....	14
7. STORAGE	14
8.ASSEMBLY.....	14
9. INSTALLATION.....	14
10. ALIGNMENT.....	15
11. ELECTRICAL CONNECTIONS.....	15
12. STARTING.....	15
13. MAINTENANCE	16
14. OPERATING PROBLEMS: CAUSES AND REMEDIES.....	19
15. RESIDUAL RISKS	21
16. REPAIRS	21
17. DISASSEMBLY	21
18. ASSEMBLY	21
19. SPARE PARTS	21
20. DISPOSAL	21

1 IDENTIFICATION

1.1 Manufacturer:

JMS SRL

VIA S.ALLENDE,3

42020 MONTECAVOLO - RE – ITALY

Tel. +39 0522 247537

1.2 Type of pump

Horizontal self-priming centrifugal pump with open impeller for handling liquids containing solids in suspension.

1.3 Model

The type of pump is shown on the pump name plate.

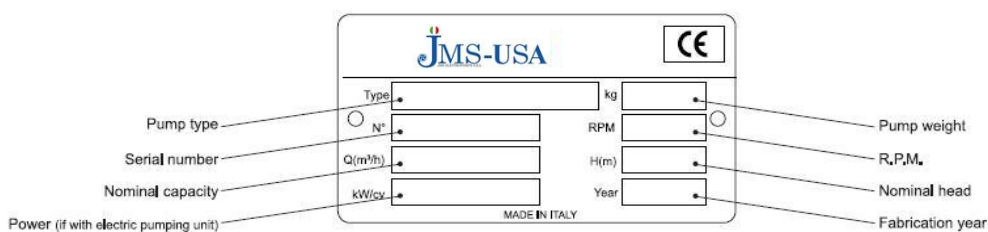
1.4 Year of manufacture

The year of manufacture is indicated on the pump name plate.

1.5 Instruction book identification

Edition: 2011/01 Revision: 01 Cod. 402

1.6 Nameplate information



The values shown for the capacity (m³/h), head (m), power (kW) and speed (RPM) refer to testing with water at 20° C and density 1000 kg/m³

1.7 Field of application

The pumps are suitable for handling liquids of viscosity up to 50 cSt containing solids in suspension. They are used in industry, civil engineering, shipbuilding, waste water treatment, construction and agriculture.

2 WARRANTY

All products manufactured by JMS SRL are guaranteed for 12 months from the date on which they are commissioned for the first time, but not more than 18 months from the delivery date. Repairs under guarantee will not extend the warranty terms. The warranty covers material and manufacturing defects that impair the way the product operates and make it unfit for the purpose for which it was designed, so long as such defects are notified immediately, in any case no later than 2 days from the date on which they are discovered. Damage deriving from the physical/chemical characteristics of the pumped fluid are not covered by the warranty, neither is damage to parts which, owing to their nature or envisaged use, are liable to wear out or deteriorate (seals, diaphragms, vacuum and pressure valves, rubber and plastic parts), nor damage which has been caused by failure to comply with the use and/or maintenance instructions, by bad or inadequate use or storage of the product or by modifications or repairs made by persons who have not been explicitly authorized by CADOPPI SRL. The warranty becomes void if the serial number of the product cannot be identified. The warranty we furnish strictly depends on the purchaser having fulfilled all the payments due until the date on which the claim is made and those that fall due during the warranty intervention. The decision to issue a credit note, repair or replace the product is at the discretion of CADOPPI SRL, whose decision about such matters is final. The goods may only be returned if authorized in writing, and must be sent carriage free to JMS SRL .

All the expenses for disassembling/re-assembling the product from/in the installation site and all other operations therein are at the purchaser's charge. The repaired or replaced goods will be re-consigned to the purchaser ex works of JMS SRL.

Substituted goods become the property of CADOPPI SRL. It is hereby understood that this warranty absorbs and substitutes the warranties or liabilities established by law, and excludes all other liability

of JMS SRL (reimbursement of damages, loss of profit, withdrawal campaigns, the purchaser's manpower, building site standstills, sale price reduction, etc.).

2.1 WARRANTY EXCLUSIONS

The warranty becomes void (besides the matters indicated in the supply contract)

- If there has been a maneuvering error ascribable to the operator.
- If the damage has been caused by insufficient maintenance.
- If spurious spare parts have been used.
- Following failure to comply with the instructions in this manual.

Damages due to negligence, carelessness, bad and improper use of the pump are also excluded from warranty coverage. Removal of the safety devices with which the pump is equipped will automatically void the warranty and relieve the Manufacturer from all deriving liability

GENERAL INSTRUCTIONS

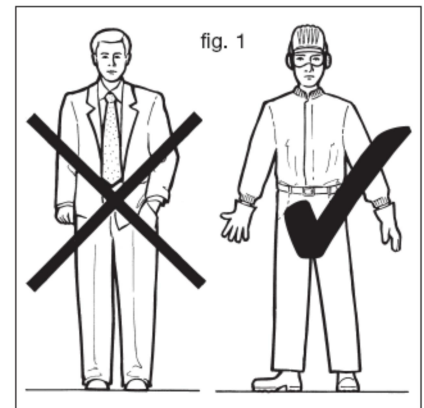
The goods must be examined on arrival to verify any damage caused during shipment.

Loss or damage must be notified immediately to the carriers and to the sender. Check that the goods correspond exactly to the description on the shipping documents and report any differences as soon as possible to the sender. Always quote the pump type and serial number.

The pumps must be used only for applications for which the manufacturers have specified:

- the construction materials
- the operating conditions (pressure, speed, temperature, etc.)
- the field of application

In case of doubt, contact **Cadoppi srl. : info@cadoppi.com**



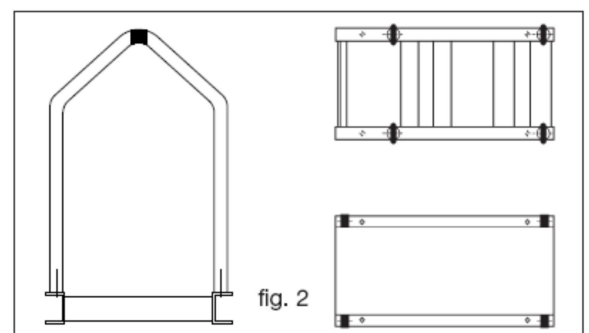
4 SAFETY AND ACCIDENT PREVENTION INFORMATION

When working near the pump, dress appropriately, avoiding clothes with loose items (ties, scarves, etc.) which could get caught in moving parts. Use overalls made according to safety regulations, gloves, insulating shoes, safety glasses, ear plugs and helmet (fig.1).

Do not carry out maintenance on the engine while it is running.

Keep hands away from moving parts (e.g. belts, couplings, etc.).

Do not mount on the pump to carry out maintenance operations of any kind.



5 IN CASE OF EMERGENCY

Turn off the electrical supply (for electrically driven pumps).

Notify the person responsible for running the plant immediately.

6 HANDLING AND TRANSPORT

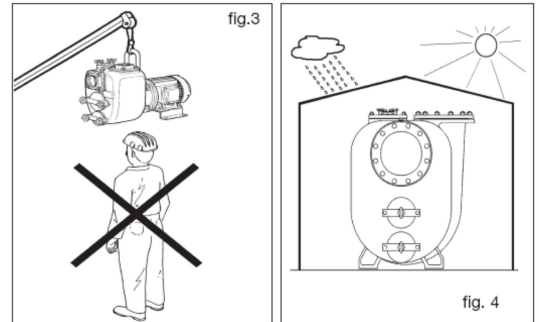
6.1 Method of transport

The unit must be safely moved and in horizontal way.

6.2 Installation

During installation and maintenance, all the components used must be handled and transported securely by using suitable slings. Handling must be carried out by specialized personnel to avoid damage to the pump and to persons. **The lifting points of the various configurations must be used to lift the unit only, which must be drained from water and disconnected from the pipes.**

Figure 2 highlights in black the lifting points of some typical base plates.



Maximum lifting speed: $V_{max} \leq 0,5 \text{ m/s}$

Do not stand or pass under the pump while it is being hoisted! (fig. 3)

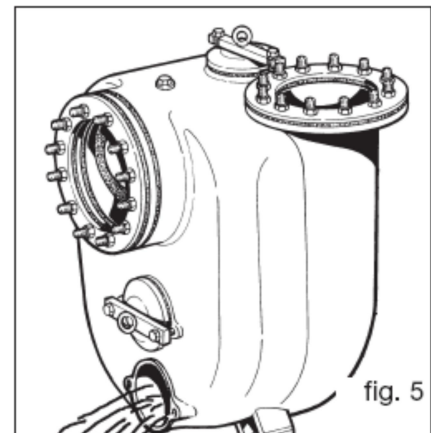
7 STORAGE

Store the pump under cover wherever possible. If the pump must be stored in the open, cover it with a tarpaulin and grease the bearings to avoid rusting. (fig. 4).

Avoid the accumulation of moisture around the pump.

Drain the casing through the drain cover (fig. 5) and the rear plug mounted on some models.

During winter months and cold weather, the liquid could freeze and damage the pump casing. If the liquid is hazardous, take all necessary precautions to avoid damage and injury before emptying the pump casing. From time to time, turn the pump shaft to avoid encrustation inside the pump.



8 ASSEMBLY

If the pump is supplied with bare shaft (pedestal version) it must be coupled to an electric

motor or internal combustion engine, taking account of the following:

- the coupling must be correctly sized for the power to be transmitted
- the coupling must be correctly aligned (see paragraph 10)
- the coupling guard must comply with applicable safety standards
- the rated power of the motor
- the power absorbed by the pump (see the motor name plate)
- the motor or engine speed (see the motor name plate)
- the pump speed

9 INSTALLATION

The base plates of electrically driven pumps must be anchored to a levelled concrete slab in which the foundation bolts have been buried

following the diagram supplied with the unit or available on request. The slab must be robust to absorb any vibrations and sufficiently

rigid to maintain the alignment of the pump to the motor.

9.1 Assembly

While the base plate is being anchored to the slab, check the flatness by placing a spirit level on the delivery flange of the pump.

If adjustments are necessary, the face of the slab must be adapted to the base plate, **never** the base plate to the slab.

The pump casing **must** be suitably supported when the pump is coupled to a gear box for agricultural use.

9.2 Pipework

Clean the pipes thoroughly before connecting them to the pump.

The suction line must have a diameter equal to that of the pump suction port (for diameters greater than that of the pump port, consult

Cadoppi). If possible, avoid curves, elbows and constrictions which can limit the flow of liquid to the pump. Do not install a foot valve: the

pump has a non return valve (14) incorporated in the suction port (fig. 10).

Install the pump as close as possible to the liquid to be pumped. Try, where possible, to reduce the length of the suction line.

The suction line connections must be completely airtight: check pipe threads, flange gaskets, quick couplings, etc.

The delivery line must let air escape from the system while the pump is priming.

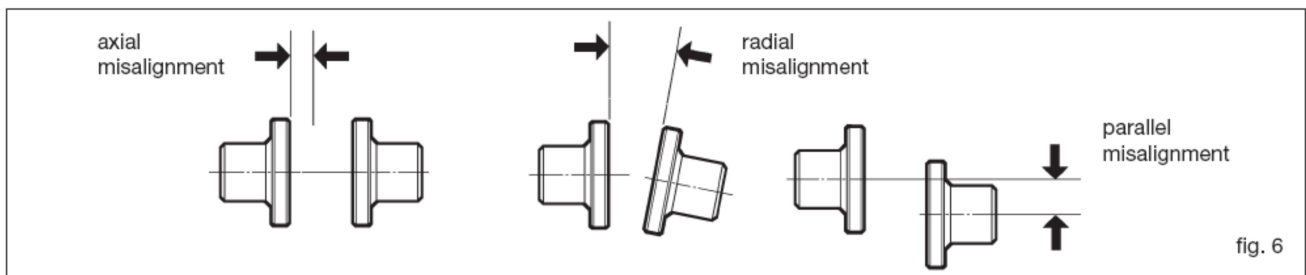
The suction and delivery lines must be mounted in such a way as not to create a strain on the pump casing.

10 ALIGNMENT

Before starting the pump for the first time, it is important to check the alignment between the components of the unit (coupling/motor).

The alignment of pumps supplied on base plates is checked during manufacture. However, it should be rechecked during installation as follows:

- set up the base plate on top of the slab and insert the anchor bolts in the holds on the base plate without tightening the nuts completely
- remove the coupling guard.
- tighten the anchor bolt nuts and recheck the alignment as shown in fig.6. Adjust the alignment, if necessary, according to the type of coupling as described in paragraphs 13.10; 13.11; 13.12.
- replace the coupling guard before starting the pump.



11 ELECTRICAL CONNECTIONS

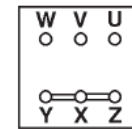
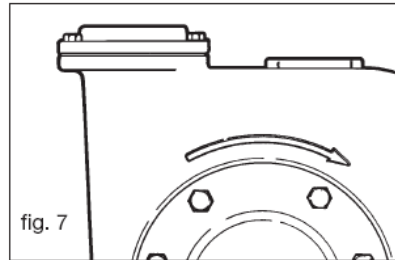
Electrical connections should only be carried out by specialised personnel.

- Follow the instructions of the manufacturers of the electric motor and electrical equipment.
- **Earth the motor correctly and ensure that the electric motor is protected by an adequately rated overload cut-out.**
- Three phase electric motors are usually supplied for 400 V (star connection). For 230 V supply, connect the motor terminal box in the delta configuration as shown in the wiring diagram attached.
- Special voltage motors may be supplied. In this case, follow the instructions supplied with the motor.
- The cross section of the cables must be adequate for the current required by the motor.

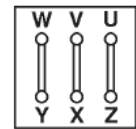
- When the motor has been connected, close the delivery line gate valve and check that the direction of rotation is correct.
 - The arrow on the pump casing shows the correct direction of rotation (fig.7); if the pump rotates in the opposite direction, interchange two of the three wires of the supply cable in the terminal box.
- On request, pumps for brackish water can be supplied with galvanic protection against corrosion.

This consists of a series of zinc discs fixed to the clean out cover. Check the state of wear of the zinc every 1000 hours and replace if necessary.

While the pump is running, check that the current does not exceed that shown on the motor name plate.



Star connection



Delta connection

12 STARTING

Before operating the pump, check that the electrical and mechanical parts of the system have been correctly installed.

Check that all safety devices are operative.

Check that the pump rotates in the correct direction (see paragraph 11).

12.1 Mechanical seal check

Before starting the pump, check the type of mechanical seal shown on the pump name plate.

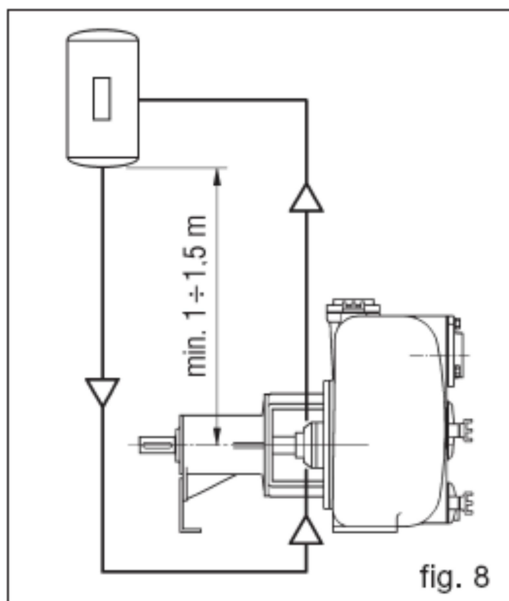
12.1.1 Pumps with type 1 or 2 mechanical seals

Type 1 and 2 mechanical seals are filled with grease during assembly. They do not require maintenance during the first 500 hours of operation of the pump.

12.1.2 Pumps with type 3 mechanical seals

Type 3 mechanical seals are not lubricated.

12.1.3 Pumps with type TCW - TC8W mechanical



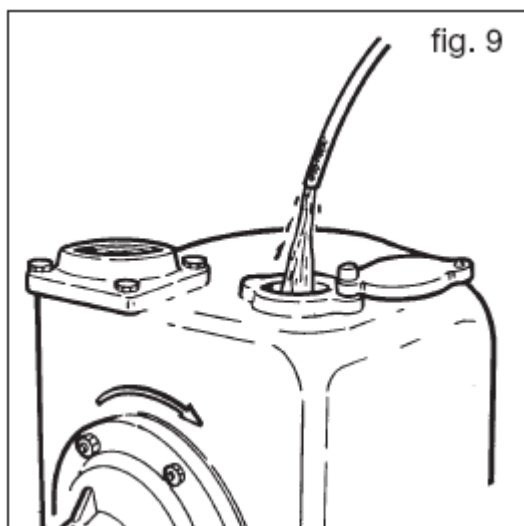
Type TCW, TC8W mechanical seals are flushed according to API 610 Plan 52 -53 (see diagram in fig. 8).

Plan 52 has a non-pressurized tank.

Plan 53 has a pressurised tank a pressure from 1 to 2 bar higher than the pump operating pressure.



The flushing liquid must be compatible with the pumped liquid.



12.2 Filling the pump casing

Fill the pump casing completely with the liquid to be pumped through the opening on the top of the casing (fig. 9). Some models have a plug. When the pump is stopped, the casing does not empty and therefore it is not necessary to refill it.

12.3 Priming

Attention: if the pump does not prime, do not operate it for more than 2 minutes to avoid overheating the liquid and damaging the seal. If the pump does not prime, read paragraph 14.1.

When the pump has primed:

- Check the shaft seal for leaks.
- Check that the current absorbed by the motor does not exceed the rated value shown on the name plate.

If the pump does not seem to be operating normally, it must be stopped and the cause found (see paragraph 14).

13 MAINTENANCE

Before maintenance is carried out, the pump must be stopped and the electrical supply disconnected. The supply must only be switched on again by the person who carries out the maintenance.

Attention: residual liquid may be found in the pump casing, head and suction line. Take the necessary precautions if the liquid is hazardous, inflammable, corrosive, poisonous, infected, etc.

13.1 Inspection and checks

Check from time to time that the pump is working correctly. Use the instruments mounted in the system (pressure gauge, vacuum gauge, ammeter, etc.) to see if the pump continues to meet its duty.

Periodic maintenance of the parts subject to wear, in particular, the impeller and wear plate, is recommended.

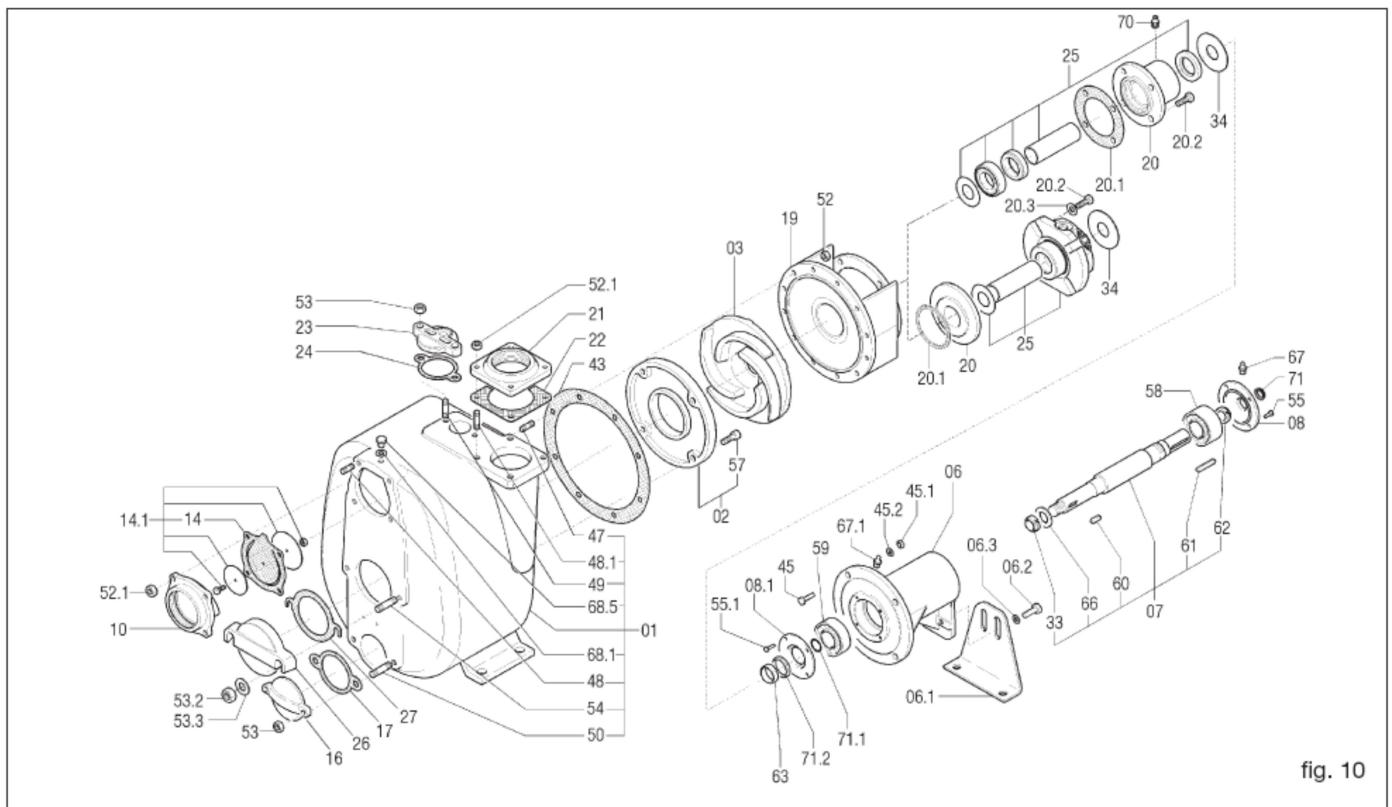


fig. 10

13.2 Replacing the impeller (fig. 10)

- Drain the pump casing as described in paragraph 7.

Attention: residual liquid may be found inside the pump casing, head and suction line; take all necessary precautions if the liquid is hazardous (flammable, corrosive, poisonous, infected, etc.)

- Unscrew the nuts (52) and remove the pump casing, taking care not to damage the casing gasket (43)
- Block the impeller (03) and unscrew the self-locking impeller nut (33)
- Remove the impeller and replace it with a new one
- If necessary, replace the casing gasket (43)
- To reassemble, proceed in reverse order.
- Check that the distance between the impeller and the front wear plate as described in paragraph 13.7

13.3 Replacing the wear plate (fig. 10)

- Drain the pump casing as described in paragraph 7.

Attention: residual liquid may be found inside the pump casing, head and suction line; take all necessary precautions if the liquid is hazardous (flammable, corrosive, poisonous, infected, etc.)

- Unscrew the nuts (52) and remove the pump casing, taking care not to damage the casing gasket (43)
- Unscrew the wear plate screws (57)
- Remove and replace the wear plate (02) If necessary, replace the casing gasket (43)
- To reassemble, proceed in reverse order
- Check that the distance between the impeller and the front wear plate as described in paragraph 13.7

13.4 Replacing the check valve (fig. 10)

- Drain the pump casing as described in paragraph 7.

Attention: residual liquid may be found inside the pump casing, head and suction line; take all necessary precautions if the liquid is hazardous (flammable, corrosive, poisonous, infected, etc.)

- Remove the nuts (52.1)
- Slip off the suction flange (10)
- Slip off the check valve (14.1)
- Mount the new check valve with the hinge towards the top
- Clean the valve seat of the suction flange (10) and reassemble it
- Some check valves have a tongue which protrudes outside the suction flange. In this case, the weight of the check valve must be borne while tightening the nuts by pulling this tongue

13.5 Replacing the mechanical seal type

1 - 2 - 3 (figs. 10, 11, 12)

- Drain the pump casing as described in paragraph 7.

Attention: residual liquid may be found inside the pump casing, head and suction line; take all necessary precautions if the liquid is hazardous (flammable, corrosive, poisonous, infected, etc.)

- Remove the nuts (52) and remove the casing (01).

- Block the impeller (03) and remove the self-locking impeller nut (33)

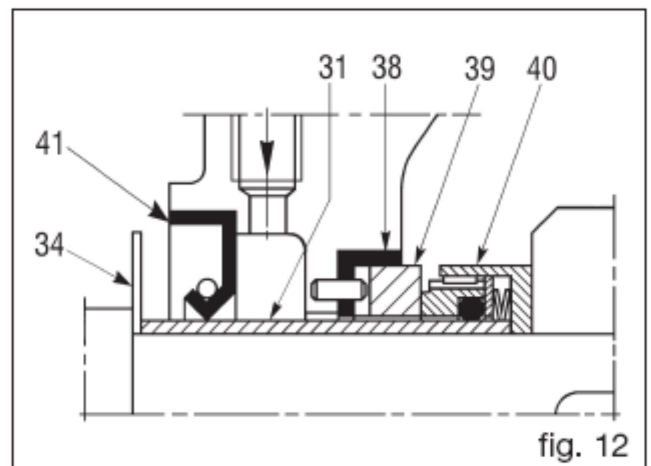
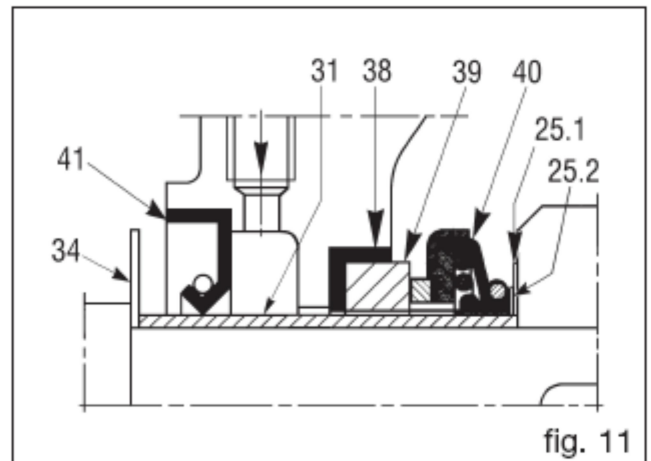
- Remove the impeller

- Remove the head (19). The rotating part of the seal (40) mounted on the shaft sleeve (31) will slide off the shaft together with the head

- Remove the stationary seat (39) and its gasket (38) from the head

- Remove the lip seal (41)

- Wash the head with solvent to remove any residue of grease and clean the seats of the stationary seal and lip seal thoroughly



- Mount a new lip seal in the head. To facilitate assembly, smear a little oil on the seat and on the outer surface of the lip seal

- Mount the stationary portion of the seal (39) together with its gasket (38). To facilitate this operation, wet the seat on the head and the gasket with methylated spirits. If necessary, use a wooden plunger or similar to push the stationary seal (39) into its seat

- **Reassemble the head taking care not to touch the shaft with the stationary seal seat. If this is ceramic, it could easily break or chip**

- Tighten the head screws (45) and nuts (45.1)

- Smear the gasket of the rotating seal seat (40) and the shaft sleeve (31) with oil and slip the seal on to one end of the shaft sleeve

- Slip the sleeve and seal on to the shaft and push to overcome the slight resistance offered by the lip seal. **Take care that the seal does not slip off the shaft sleeve.**

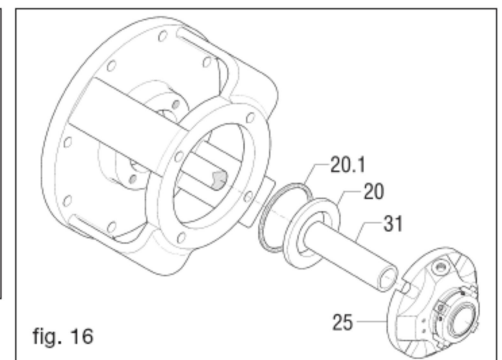
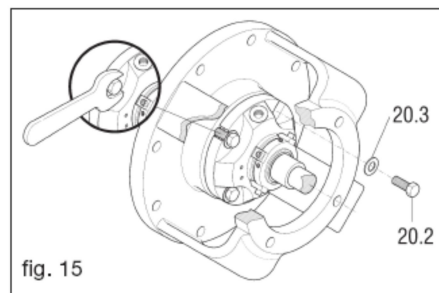
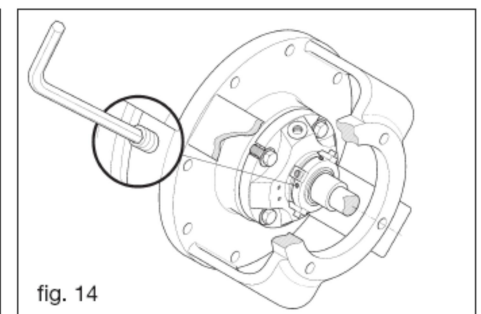
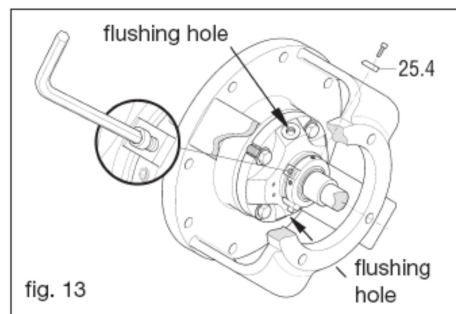
- Mount the seal support ring (25.1). Push this forward until it is possible to reassemble the impeller key (60)
- Reassemble the impeller (03), the impeller washer (66) and tighten the impeller nut (33)
- Check that the distance between the impeller and the front wear plate as described in paragraph 13.7
- Reassemble the casing gasket (43) after smearing both sides with grease
- Reassemble the casing and tighten the nuts, checking that the impeller is free to rotate
- Fill the seal lubrication chamber (see paragraph 12.1.1, 12.1.2) with grease.

13.6 Replacing type 4 - 5 cartridge seals (fig. 10, 13, 14, 15, 16)

- Drain the pump casing as described in paragraph 7.

Attention: residual liquid may be found inside the pump casing, head and suction line; take all necessary precautions if the liquid is hazardous (flammable, corrosive, poisonous, infected, etc.)

- Unscrew the nuts (52) (fig. 10) and remove the pump casing, taking care not to damage the casing gasket (43)
- Block the impeller (03) and remove the self-locking impeller nut (33)



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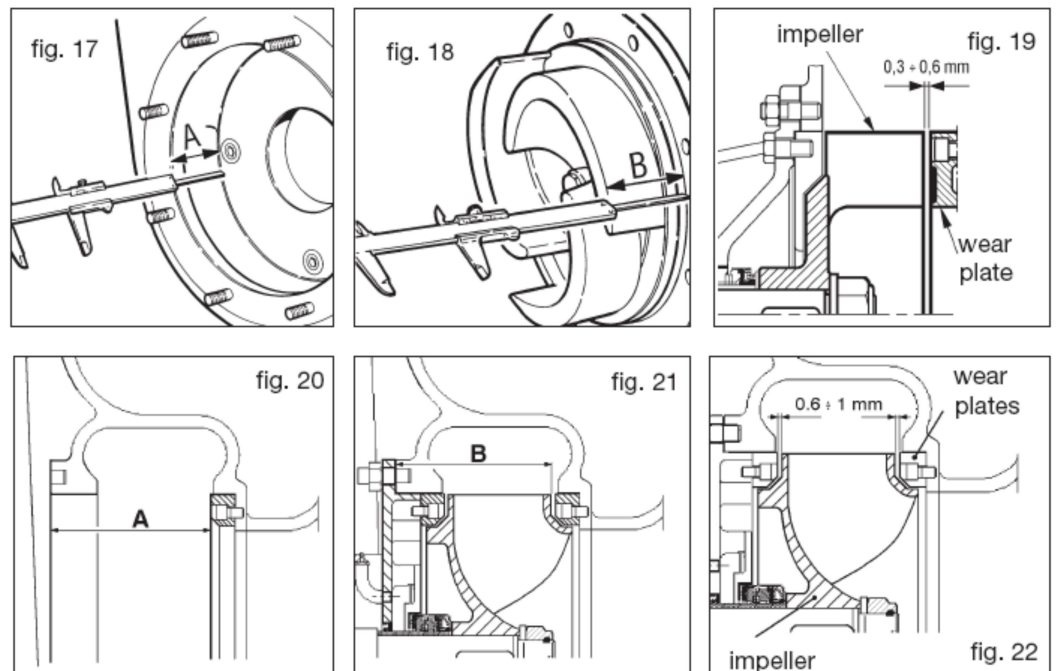
- Remove the impeller
- Disconnect the flushing lines.
- Fix the seal lock setting plates (25.4) in their seats (fig. 13)
- Loosen the grub screws of the shaft sleeve (fig. 14)
- Unscrew the screws (20.2) which fix the seal flange to the head (fig.15)
- Remove the head (19)
- Remove the seal (25), the shaft sleeve (31), the seal box (20) and the gasket (20.1)
- If the gasket (20.1) is damaged, replace it.

To assemble, proceed in reverse order

- To facilitate the initial assembly of the seal (fig. 16), smear a little oil on the shaft sleeve (31)
- Tighten the fixing screws (20.2) carefully (fig. 15) so as to avoid strain on the stationary seat of the seal
- Tighten the grub screws as far as they will go (fig. 14)
- Remove the setting plates (25.4) which hold the seal (fig. 13) and fix them in the appropriate holes in the flange so that they can be used again to remove the seal
- Reconnect the flushing lines, begin flushing and bleed out air from the area around the seal. **The seal must not run dry even for a few moments.**

13.7 Positioning the impeller with reference to the wear plate(s)

- In all models, the distance between the top of the impeller blades and the surface of the wear plate must be between 0.3 - 0.6 mm (fig. 19). For the 12" model, the distance between the impeller and the front and rear wear plates must be between 0.6 - 1 mm (fig. 22).



To achieve this, dimensions A and B in figs. 17, 18, 20, 21 must be as nearly as possible equal. To this end, use the shims (25.2) (fig. 11) supplied with spare mechanical seals. These shims are used to move the impeller further forward if it is too far from the front wear plate or too near the rear wear plate. The shims should be mounted between the seal support ring (25.1) (fig. 11) and the impeller. Further adjustments can be carried out using casing gaskets (and rear wear plate gaskets on models which fit these). The presence of the casing gasket (43) (fig. 10) 0.5 mm thick then creates the correct distance (fig. 19).

13.8 Maintenance of the bearings (fig. 10)

The pump is supplied with the bearings already greased and does not require maintenance for the first 500 hours of operation.

The bearings in the bearing housing must be lubricated appropriately, avoiding the use of too much grease which can cause overheating and, as a result, damage to the bearings. **NOTE: consult ANNEX 1 on page 52 for the JP/JE monobloc versions.**

13.9 Replacing the bearings

- Drain the pump casing as described in paragraph 7.

Attention: residual liquid may be found inside the pump casing, head and suction line; take all necessary precautions if the liquid is hazardous (flammable, corrosive, poisonous, infected, etc.)

- Remove the casing, the head and the mechanical seal
- Remove the flexible coupling hub and the shaft key
- Remove the outer bearing cover (08)
- Extract the shaft from the coupling side
- Extract the bearings using a bearing extractor
- To reassemble, proceed in reverse order.

13.10 Replacing the TWIN-DISC coupling blocks (RBD series)

- Remove the pump from its seat
- Remove the worn blocks and replace them with new ones
- Check the state of wear of the aluminium flange
- Couple the pump to the engine
- Maximum alignment error: 0.7 mm
- When ordering spare rubber blocks, specify the shaft diameter and the type of coupling.

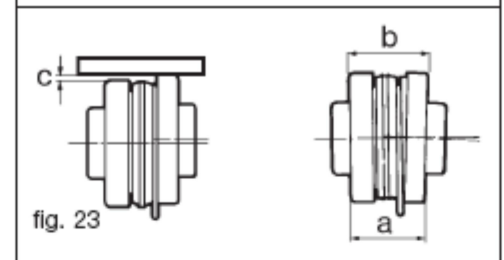
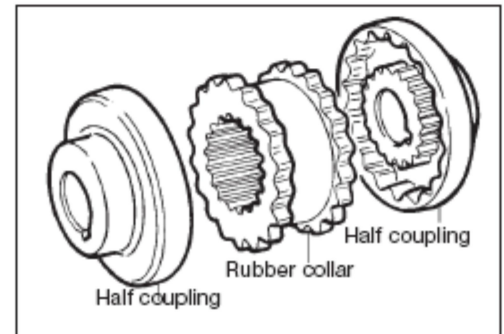
13.11 Replacing the rubber collar of SURE-FLEX couplings (fig. 23)

- Unscrew the anchor bolts at the base of the pump or motor and separate the two halves of the coupling
- Remove the worn rubber collar and replace it with a new one. In the case of two piece rubber collars (type S) leave the steel ring free to move in one of the two grooves near the indentation
- Move the pump towards the motor and fit the indentation of the half coupling to that of the rubber collar
- Close the coupling leaving an axial play of 2 mm max. for type J couplings and 3 mm max. for type S couplings
- Check the radial and angular alignment as follows:

Radial: (fig. 23) with a ruler placed on the outer surface of the half couplings, measure the maximum misalignment (dimension C) in at least four points around the circumference and try to bring it as close as possible to zero (see table)

- **Angular:** (fig. 23) with a gauge, measure at a minimum of four points the distance between the two halves of the coupling and bring the difference (b-a) as close as possible to zero (see table)

Coupling type	Max. speed (RPM)	Max. torque dNm	
		Cont. duty	Intermitt. duty
8 S	4500	17	2
10 S	4000	31	30
10 SS	4000	31	30
11 S	3500	48	62
14 S	2800	94	121



Coupling type	C mm	(b-a) mm	Torque N m
J4	0,25	1,1	10
J5	0,4	1,4	20
S6	0,4	1,8	40
S7	0,5	2,1	70

- Tighten the anchor bolts at the base of the pump and motor
- When ordering spare parts, specify the type of coupling (stamped on the inside of the half couplings) and the shaft diameter.

13.12 Replacing the rubber dowels of GFB flexible couplings (fig. 24)

- Unscrew the anchor bolts at the base of the pump or engine and separate the two halves of the coupling
- Remove the worn dowels and replace them with new ones, fixing them in place with a little adhesive
- Move the pump towards the engine until the coupling is completely closed, then draw it back by 2-3 mm to separate the two halves of the coupling
- Tighten the bolts which anchor the pump and engine to the base plate
- When ordering dowels, specify the diameter of the shaft and the type of coupling.

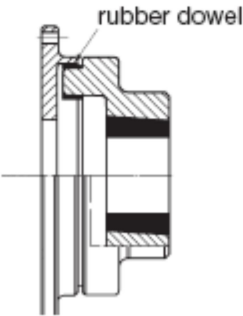


fig. 24

Coupling type	Max torque kgm	rpm
14	15	4800
20	25	4400
27	40	4100
40	60	3500
55	80	3300
88	110	3000
110	150	2700
145	190	2500
180	240	2200
250	300	2150
330	400	2000

14 OPERATING PROBLEMS: CAUSES AND REMEDIES

Attention: before examining the possible causes of operating problems, ensure that all control instruments (vacuum gauge, pressure gauge, revolution counter, flow recorder, electrical gauges etc.) are working correctly.

14.1 The pump does not prime

1 The pump casing is empty or non sufficiently full

fill the pump casing through the priming cover or plug (fig. 9)

2 The liquid inside the pump casing is overheated

add cold liquid to the pump casing through the priming cover or plug (fig. 9)

3 Air leaks in the joints or cracks in the suction line

Check that couplings and clamps are tight and inspect the suction line

4 Delivery line under pressure

bleed the delivery line

5 Low rotation speed of the pump

increase the speed only after having verified the contract data and the pump performance curve

6 The impeller is worn or broken

check the state of the impeller through the impeller inspection cover (26) (fig. 10), or remove the pump casing as described in paragraph 13.2

7 The cutwater (leading edge of the volute) is worn

remove the casing as described in paragraph 13.2. Build up the cutwater with weld and shape it to restore the original profile. If the cutwater is severely damaged, replace the casing.

8 The suction strainer (if fitted) is clogged

remove the obstructions

9 The suction lift is too high

reduce the suction lift

10 Air enters through the mechanical seal

disassemble the seal and clean it (see paragraph 13.5, 13.6); if the problem persists, change the seal

11 The suction or discharge lines are obstructed or clogged

locate the obstructed or clogged area and clean

14.2 The pump does not deliver liquid

12 The pump is not primed

see the points listed under 14.1

13 The head required by the system is greater than the rated head of the pump

revise the system design or re-select the pump

14 Excessive friction losses in the suction line

revise the distribution of elbows, valves, restrictions etc.; if necessary increase the diameter of the pipework

15 The impeller is clogged by foreign objects

disassemble the casing and remove the foreign objects

16 The suction or discharge lines are obstructed or clogged

locate the obstructed or clogged area and clean

14.3 The pump does not have sufficient capacity

17 Air leaks in the suction line

check that the couplings are airtight and inspect the suction line

18 The impeller and/or wear plate are worn

they should be replaced by disassembling the pump as described in paragraphs 13.2 and 13.3

19 The diameter of the suction line is too small

replace the suction line

Check the other possible causes in paragraph 14.2

14.4 The pump does not provide enough pressure

20 The viscosity of the liquid is higher than expected

contact the manufacturers after measuring the viscosity; for centrifugal pumps this should not exceed 50 cSt Check other possible causes: see point 5 of paragraph 14.1 and paragraph 14.2

14.5 The pump absorbs too much power

21 The rotation speed is too high

check the correct rotation speed

22 The pump operates under conditions which are different for those specified

check the operating conditions of the pump and compare them to those on the pump name plate

23 The density of the liquid is higher than specified

measure the density (or specific gravity) of the liquid and compare it to the agreed figure

24 Incorrect alignment of the unit

check that the unit is correctly aligned as described in paragraph 10

25 Friction inside the pump between the rotating and non rotating components

remove the pump casing as described in paragraph 13.2 and check if there are signs of rubbing on the surfaces

26 Foreign bodies trapped in the impeller

remove the pump casing as described in paragraph 13.2 and remove the foreign bodies

14.6 The pump vibrates and is noisy

27 The pump is operating at too low a capacity

check the settings of the valves in the system and the readings on the pressure and vacuum gauges

28 The pump or the pipework are not well fixed

check that the pipework is correctly clamped

29 The pump cavitates

see paragraph 14.2

Check the possible causes in paragraph 14.1

30 Foreign bodies trapped in the impeller

remove the pump casing as described in paragraph 13.2 and remove the foreign bodies

14.7 The pump jams

31 Mechanical breakdown

check the shaft, flexible coupling, motor, pulleys and belts, gear boxes etc. for breakages

32 Foreign bodies jammed inside the pump

check inside the pump casing by opening the inspection cover (26) (fig.10)
otherwise remove the pump casing as described in paragraph 13.2

14.8 The bearings have a short lifetime

33 Lack of lubrication

lubricate the bearings as described in paragraph 13.8

34 Foreign bodies in the bearings

change the bearings as described in paragraph 13.9

35 The bearings are rusted

change the bearings as described in paragraph 13.9

14.9 The mechanical seal leaks

36 1 - 2 type seal

this type of seal is suitable for pumping dirty liquids or liquids containing abrasive particles or petroleum products at temperatures up to 110°C; grease every 500 hours through the grease nipple until grease comes out behind the seal. If well lubricated, this seal can run dry for 2 minutes. If the seal leaks during operation, it must be replaced (see paragraph 13.5)

37 3 type seal

this seal does not require maintenance. If it leaks, replace it (see paragraph 13.5)

38 4 - 5 type flushed seal

before starting up the pump, connect the flushing hole in the seal area to the flushing liquid line with a pressure of at least 2 bar. Ensure before starting the pump and during operation that there is a constant flow of flushing liquid in the seal. Flushing ensures that the liquid will be diluted in the seal area to allow the seal to operate under the best possible conditions. When the pump is stopped, and will not be restarted again for some days, empty the pump as described in paragraph 7 and wash it completely through the upper priming cover (fig.9)

14.10 The seal overheats

The pump does not prime (see paragraphs 14.1 and 14.9)

14.11 The elastomer portions of the flexible coupling wear out quickly

Check that the pump is correctly aligned as described in paragraph 10

15 RESIDUAL RISKS

Residual risks are those which cannot be eliminated through the pump design:

- knocks
- anomalous pressure rises
- misuse
- manoeuvring errors in the vicinity of the pump

16 REPAIRS

Before carrying out repairs on the pump it is essential to:

- turn off the mains power (follow the directions in paragraph 13)
- close the gate valves on the suction and discharge sides of the pump
- if the pumped liquid is hot, wait until the pump has cooled down to ambient temperature
- **if the pumped liquid is hazardous, follow the safety procedures for handling hazardous liquids**
- drain the pump casing as described in paragraph 7
- remove and clean any residues of the pumped liquid

17 DISASSEMBLY

17.1 Removing the pump from the system

Carry out the instructions in paragraph 16

- remove the nuts of the suction and discharge flanges
- remove the bolts which fix the pump to the base plate
- slip the pump out of the flexible coupling (if fitted) or remove it from the electric motor
- before lifting the pump with appropriate lifting devices, check the weight of the pump

18 ASSEMBLY

18.1 Mounting the pump in the system

- lift the pump using suitable lifting devices
- position the pump on the base plate
- reconnect to the flexible coupling or electric motor
- check the alignment as described in paragraph 10

- fix the pump to the base plate
- connect the pump to the pipework
- remount any coupling guards fitted

19 SPARE PARTS

To ensure that the pump continues to operate well as time goes on, it is advisable, when ordering the pump, to acquire the spare parts recommended for the first maintenance operation:

mechanical seal

impeller

wear plate

set of gaskets

check valve

self-locking impeller nut

19.1 Ordering spare parts

To order spare parts, specify the following:

- **type of pump**
- **serial number of the pump**
- **reference number and description of the part as shown in the exploded drawing**

20 DISPOSAL

- Do not abandon in the environment
- Metal parts can be recycled as scrap
- Grease and oil must be recovered and stored as prescribed by the relevant legislation for disposal by approved agencies
- Elastomer gaskets must be removed and disposed of in an approved waste disposal unit.