

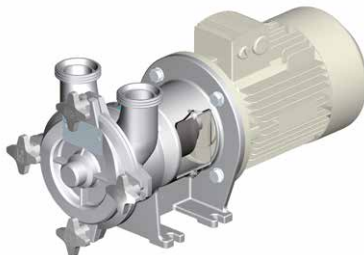
TECHNICAL SERVICE
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SELF-PRIMING PUMPS **A Series**

A 21-31



A 41-51-66-81



**INSTRUCTIONS FOR INSTALLATION,
OPERATION AND MAINTENANCE**

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FOREWORD

- Read the instructions carefully and keep them for future consultation.
- C.S.F. Inox S.p.A. reserves the right to make any changes to the documentation it deems necessary without being obliged to update publications that have already been issued.
- When requesting information, spare parts or assistance, always specify the pump type (*) and serial number (**) in order to ensure fast and efficient service: the complete code is given on the plate and in the purchase documents.

Plate example

Item. <input type="text"/>		
Mod. A21-4-0,5/B.Y28 (*)		
N° 12345 (**)	Giri 1400	
kW 0,33	Volt 220-380	Hz 50

1 SYMBOLS

WARNING	<i>Pay great attention to the text parts indicated by this symbol.</i>
	Danger: <i>the non-observance of instructions can cause serious damages to persons and/or objects.</i>
	Danger: <i>only skilled personnel is allowed to carry out operations concerning the electric parts.</i>

2 SAFETY WARNINGS

When the pump is working the following occurs:

- Electric parts are in tension.
- Mechanical parts are moving.
- Pump body, pipelines and articulations are under internal pressure. Therefore do not remove any protection or locking, do not loosen screws or clampings, as this can cause serious damages to persons or objects. The knobs joining the pump casing and the cover must be well tightened and they should not be easily unscrewed by hand. The tightening of the knobs must be carried out by means of a key and NOT by hand.
- Non-observance of inspection and maintenance can cause damages to persons and objects, especially when dangerous or toxic liquids are pumped.
- When pumping liquids at a temperature over 60° C, adequate protection and warning signals are required.
- When you buy a pump with bare shaft, motor coupling operations have to be carried out according to technical directions and law, providing adequate protections for joints, gear belts, etc.
- Operations on the electric parts have to be carried out by skilled personnel, according to technical directions and law, on authorisation of the responsible installer.
- Installation must ensure an adequate ventilation, in order to cool the engine, as well as enough space for maintenance operations.

Before carrying out any operation which requires to disassemble the pump (inspection, cleaning, seal replacement, etc.), the following preliminary operations have to be carried out:

- switch off engine tension and disinsert electric connection;
- close valves on suction and outlet pipelines, in order to avoid the risk of inundation;
- use adequate protections for hands and face, if the pump contains liquids which are injurious to health (for example acids, solvents, etc.);
- consider if the liquid which flows out of the pump when disassembling is dangerous and arrange for adequate safety measures.

3 GUARANTEE

All products manufactured by C.S.F. Inox are guaranteed to the purchaser, for one year from the date of purchase, against hidden defects in materials or manufacture, providing that they are installed and used according to instructions and recommendations of the manufacturer. Excluded from the guarantee other than distinctive wear and tear are repairs to damage caused by improper use, abrasion, corrosion, negligence, defect of installation, non-observance of inspection and maintenance, use of non-genuine spare parts, cause of accident or fortuity and from any action carried out by the purchaser not according to the normal instructions of the manufacturer.

WARNING Before returning to C.S.F. Inox S.p.A. any item to be substituted or repaired under guarantee, inform about the problem the Customer Assistance Office and follow instructions of the manufacturer. Any item must be properly packed in order to avoid damages during the transferring and **a technical report explaining the fault occurred, must accompany the returned item/s.**

Any item with a presumed fault should be returned to C.S.F. Inox S.p.A. with shipment costs at purchaser's charge, unless different agreements are given.

C.S.F. Inox S.p.A. will examine, repair and/or replace the returned piece and then send it back to the purchaser on ex-works basis. Should the piece be found under warranty, no further costs will be debit the purchaser. If, on the contrary, the fault is not found under warranty, all necessary reparations and replacements will be charged at normal cost to the purchaser. Commercial parts incorporated in C.S.F. products are guaranteed by their corresponding manufacturers.

4 GOODS TRANSPORTATION, RECEIVING AND TRANSFERRING

4.1 TRANSPORTATION

The packings of all pumps manufactured by C.S.F. Inox S.p.A. are defined when making the order. Unless prior arrangements are given, goods will be packed only for transit conditions and not for long-term storage; in case it should be necessary to store the pumps outside, you are requested to cover the pumps appropriately in order to protect the electrical parts (motor) from rain, dust, humidity etc.

4.2 RECEIVING

WARNING By goods receiving, the wholeness of packing must be verified, in order to identify possible damages to the content occurred during transferring and to claim them immediately to the carrier. Should any damage be ascertained, the following procedure must be observed:

- collect the goods with reservation;
- take the necessary pictures showing the damages;
- notify the suffered damages, by registered airmail, to the carrier by sending at the same time the pictures taken to show the damaged pieces.

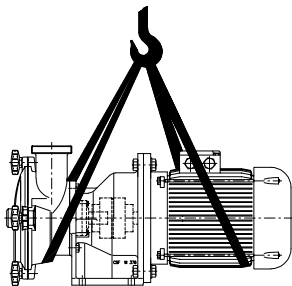
4.3 TRANSFERRING



Carry the packed pumps as close as possible to the place of installation by means of appropriate lifting devices and unpack them. During this operation take care, as unsteady parts could fall down.

The material used for packing (wood, paper, cellophane, etc.) should be properly got rid, according to the corresponding rules in force in receiver's country.

After unpacking the pump, use special lifting belts and move the pump-motor-set to the place of installation; never use the eyebolts on the motor to move the pump, as the eyebolts are for moving the motor only. In versions complete with shroud, take the shroud off before moving the pump-motor-set, in order to avoid damages.



5 DESCRIPTION

The A series comprises centrifugal self-priming pumps with a side channel and star-shaped rotor.

The suction and discharge ports are both located on the body facing upwards with the suction port on the right as seen from the motor end. All models have threaded connections for fittings to DIN 11851 standards (unless otherwise requested). The front cover is easy to open to facilitate cleaning and, in the A series, does not require the piping to be removed.

Pumps (model) A21 and A31 are one-piece units with the impeller directly fit on the electric drive. Pumps are made from AISI 316 stainless steel and chemically polished.

Pumps (model) A41, A51, A66 and A81 are fit on a lantern guard and fit on a B5 (footless) electric drive through an elastic joint. They are made of AISI 316 stainless steel. Upon request, drive can be supplied with a stainless steel protective casing.

All models include mechanical seals. Mechanical sealing devices materials are chosen according to pumped liquid. In A21-A31 models, mechanical sealing is external while the remaining models include sealing inside (see paragraph 11.3).

These pumps are designed for applications where the liquid to be pumped :

- is not subject to pollution of any kind,
- is at a temperature between -30°C and +140°C,
- must under no circumstances come into contact with the outside environment,
- is chemically aggressive.

5.1 SOUND PRESSURE LEVEL

The sound pressure level of self-priming pumps is the following:

for models A21 - A31 - A41 between 70 and 75 dB(A);

for model A51 between 75 and 80 dB(A);

for models A66 - A81 between 85 and 90 dB(A).

The measurement has been made by means of a phon-meter placed at 1 m distance from the pump and at a height of 1.6 m from the ground. Preliminary condition is that the pump is fixed correctly; the above mentioned values do not take into account external noise sources (e.g. valves, abrupt hydraulic deflections).

6 NON-PERMITTED USES

Do not use the pump with a suction pressure greater than the specified value (0.5 times the discharge head generated by the pump).

The pump must always be used in an environment appropriate to the level of protection of the motor. Always check this on the motor plate before installation.

WARNING! THE PUMP MAY NOT BE USED IN ENVIRONMENTS WHICH REQUIRE A HIGHER LEVEL OF PROTECTION OR A HIGHER SPECIFICATION MOTOR OR ELECTRICAL PARTS.

Components complying with the safety standards for the environment in question must be used.

7 INSTALLATION

The pump must be connected by means of the appropriate fittings. Insert the seal and tighten it using suitable spanners, ensuring that the piping does not push down on it. For types A41, A51, A66 and A81, use flexible couplings if the motor needs to be connected. Check that the distance of the two semi-couplings is about 4 mm and lock using the grub screws located on the hubs.

7.1 SUCTION AND INFLOW CONDITIONS

(NPSH = Net Positive Suction Head)

NPSH of system (available NPSH)

In order to ensure that pump operation is free from cavitation, it is essential to observe the maximum permitted suction lift **ha geo max** or the minimum allowable head **hc geo min**.

NPSH of pump (required NPSH)

The pumps can operate correctly only if vapour has not formed inside. For this reason the static head at the reference point for the NPSH is the centre of the impeller, that is the point of intersection of the pump shaft axis with the vertical plane that passes through the external points of the blade inlet corners. NPSH is the value required by the pump, expressed in metres, obtained from the performance curve. In practice 0.5 m should be added to this value as a safety margin.

7.2 PIPING

In order to prevent the creation of harmful stresses, the suction and discharge pipes must be connected to the pump ports without the use of force. These pipes must also be supported independently avoiding causing stresses on the pump.

The internal diameter must be the same size as the pump connections. It must in any case not be smaller to avoid head loss and/or poor performances. Always use elbows with large radius. If the pipe diameter changes along the line, use reduction cones.

The suction pipe must be as short as possible and rise as it moves towards the pump if it is sucking from a tank, if on the other hand the pump is below the level of the liquid, the pipe should descend slightly. If

the pump is used for transporting hot liquids, fit expansion joints to compensate any expansion of the piping. The maximum velocity of the liquid in the suction pipe must not be greater than 3 m/s. Velocities between 1 and 2 m/s are recommended.

The suction pipe must be designed in such a way as to prevent air from entering the pump. For this reason, when sucking from a tank located at a lower level, the pipe must reach below the free surface of the liquid. Avoid creating obstacles which could increase suction losses disrupting smooth fluid flow. Make sure that there are no restrictions, sharp turns or tight elbows on the discharge line, since these increase disturbance near the pump.

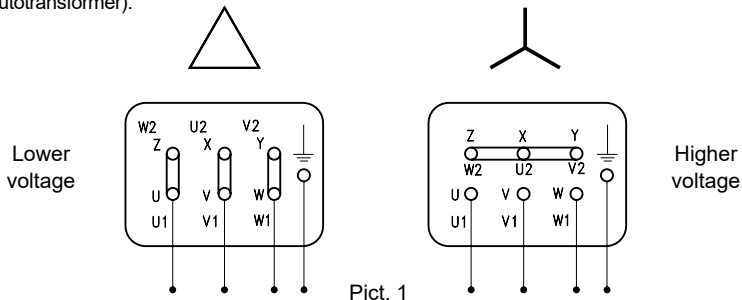
7.3 ELECTRICAL CONNECTION



Make the electrical connection only after the hydraulic connection has been completed; set up the motor control system in conformity with the technical standards and regulations in force (EN 60204-1): in particular a manual electric power switch must be installed with adequate current switching capacity; devices for over-current and overload protection (e.g. fuses, automatic switches, etc.) must also be fitted, plus, if necessary, a device to prevent accidental restarting.

Check that the main frequency and voltage and the available power are suitable for the motor installed. All the material used for the electrical connection (cables, cable clamps, switches and shielding) must have a suitable level of protection for the environment in which it is installed. Be sure to use cables of sufficient cross-section for the current shown on the motor plate so as to prevent them from overheating. Before doing anything else, make the motor's earth connection, using the terminal on the motor and a cable of sufficient cross-section. The cables may be connected to the terminal board using either a delta or star arrangement. Follow the data given on the motor plate for the main voltage, as shown in the diagram in Pict.1; ensure that the terminals are clean and tight and not under stress.

When starting, the motor's current absorption increases briefly to 5-6 times the nominal value. If the mains supply is unable to sustain this increase in absorption, use a star-delta starter or other kind of device (e.g. an autotransformer).



Pict. 1

C.S.F. Inox S.p.A. will accept no responsibility for damage to property and/or injury to persons caused by failure to comply with technical standards and regulations in force.

8 OPERATION

8.1 PRELIMINARY OPERATIONS AND STARTING

When first starting, fill the pump with liquid so as to create the pressure drop required for suction. When starting subsequently the quantity of liquid that remains in the pump will be sufficient to ensure self-priming even if the pipe is empty. Make sure that the pump does not become completely empty in the event of installation under a vacuum or to a siphon. If necessary, fit a check valve.



- Check that the pump turns freely under hand pressure.
- Check that the knobs joining the pump casing and the cover is well tightened and that it cannot be easily unscrewed by hand. The tightening of the knobs must be carried out by means of a key and NOT by hand.
- Check that the pump turns in the market direction.
- Check that any gate valves installed on the suction and discharge pipelines are open.
- Start the pump and check the turns direction; before restarting it is extremely important to wait until the pump has stopped moving completely.

8.2 OPERATING CHECKS

- If the pump does not generate the required discharge head rapidly, facilitate priming by stopping the pump and adding liquid.
- Check that the absorption of the motor does not exceed the value specified on the plate.
- The pump must always work smoothly and without vibrations.
- Do not operate without liquid and in any case avoid prolonged operation with the discharge gate valve closed.

WARNING WITH SERIES A PUMPS NEVER CLOSE DISCHARGE SIDE COMPLETELY.

- Mechanical seal: check that there is no leakage along the shaft.

9 WORKING IRREGULARITIES

The pump does not prime

- Air has entered the suction piping; check the seals on the fittings and tighten them sufficiently.
- Suction pipe not submerged in liquid
- Clearances between impeller/cover and impeller/body have increased. Check and correct.
- No liquid in the pump. Introduce liquid.
- Reduce loss of suction head; reduce the suction height.
- Formation of air pockets; eliminate and if necessary fit an air unloader on discharge.

No flow

- Pump not primed; (see point 8 and previous point).
- Pump turning in wrong direction.
- Suction port obstructed.
- On-off valves closed.

Insufficient flow

- Increased system back pressure on discharge side; increase piping diameter.
- Air entering mechanical seal; check its condition.
- Viscosity of fluid greater than that specified in the order. Contact manufacturer.
- Clearances between impeller/cover and impeller/body have increased. Check and correct.

Loss of head

- Back pressure on discharge side has fallen; throttle the suction pipe.
- Clearances between impeller/cover and impeller/body have increased. Check and correct.

Increase in absorbed power

- Flow rate is lower than required.
- Pump is turning at higher speed.
- The impeller does not turn freely. Check it.
- Viscosity and/or specific weight are higher than stated.
- Bearings and bushings are not in good condition.

Increase in absorbed current

- The power required has increased (see previous point).
- Main voltage value has fallen.
- There is a fault in the electrical system.

10 SEALS

All C.S.F. self-priming pumps of the A series are fitted with unified mechanical seals according to EN 12756 - ISO 3069 standards, to grant a perfect sealing. The type of mechanical seal and material used are chosen according to the liquid to be pumped.

WARNING Before using the pump for any liquids other than those specified when selecting and ordering, ensure that the mechanical seals and gaskets are suitable for the new product.

11 MAINTENANCE

11.1 EXTENDED STOP

When stopping the pump for a longer time, empty the pump completely and wash it accurately in order to avoid the formation of scales and/or encrustations. When starting the pump again, please follow the above mentioned instructions.

11.2 CLEANING THE PUMP

The pump does not require any special washing procedures. The washing cycles normally used for the plant in which it is installed are quite satisfactory. When using the pump for liquids that tend to harden or crystallize, always make sure it is washed before periods when the machine is to be taken out of operation. This will ensure durability of the seal and of the pump itself.

It is the user's responsibility to ensure that the washing liquids are compatible with the process liquid and the pump.

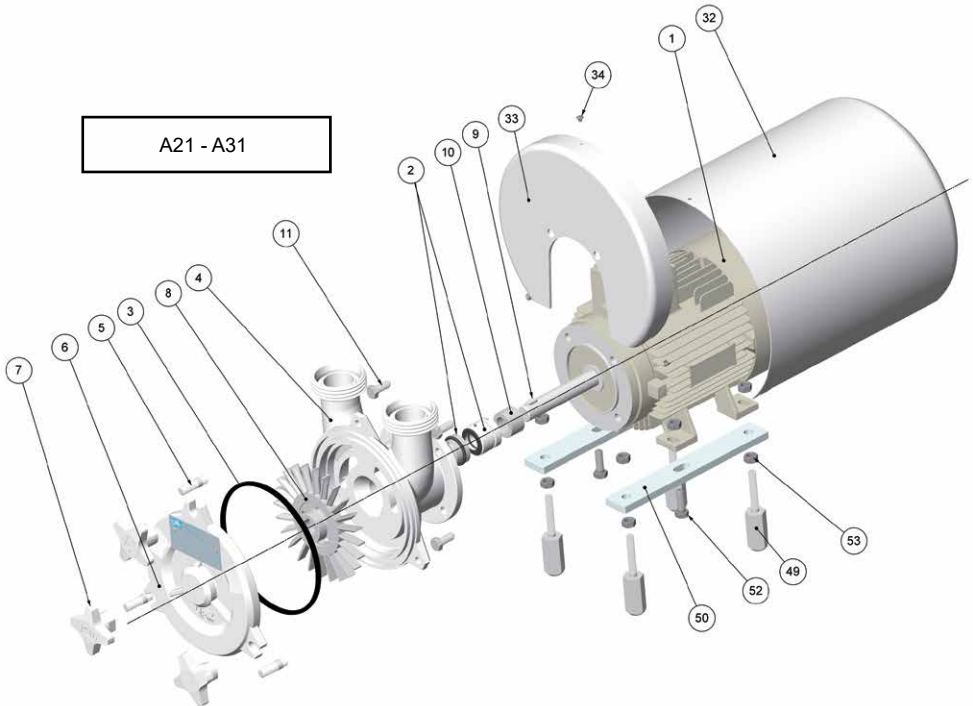
11.3 A21 - A31 - DISASSEMBLING AND ASSEMBLING

DISASSEMBLING: Disassemble the shroud (32), if any, and eccentric (33).

Unscrew the three wing nuts (7), take the casing cover (6) off and remove the impeller (8) from the shaft by pulling it axially; remove the key (9). Disassemble the pump casing (4) by unscrewing the fastening screws (11) which keep it connected with the motor (1).

Then disassemble the mechanical seal (2): remove the seal fixed part placed on the back side of the pump casing (4); remove the seal rotating item from the shaft by letting it slide on it. Take the mechanical seal spacer (10) off the shaft.

ASSEMBLING: Check that the driving shaft is not damaged, clean it accurately, polish it by a fine abrasive cloth (grade 600) and lubricate by a neutral lubricating (either Vaseline or silicone). Arrange the motor (1) in a vertical position. Insert the mechanical seal spacer (10) on the shaft by letting it slide until stop; place the mechanical seal (2) on the shaft, by letting it slide on it until it strikes against the spacer (10). Place the mechanical seal (2) in the pump casing (4), place the pump body on the motor (1) and screw fastening screws. During the pump placing, pay extreme attention not to damage the existing items. Place the key (9) back and insert the impeller (8) on the shaft. Place the cover casing (6) on the pump casing (4) and screw the wing nuts (7).
 Note: Handle the seal fixed and movable parts with care in order not to scrape contact areas.



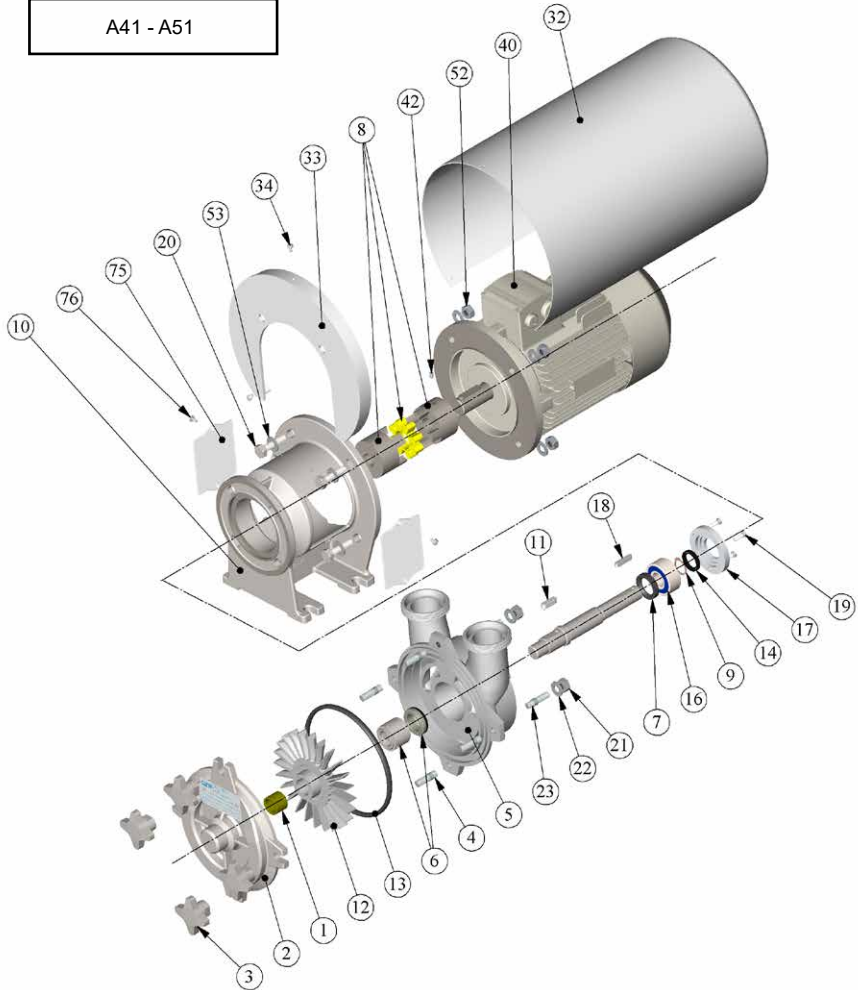
11.4 A 41 - A 51 - DISASSEMBLING AND ASSEMBLING

DISASSEMBLING: Disassemble the shroud (32), if any, and eccentric (33). Remove the pump from housing (10) by unscrewing the fastening nuts (21); remove the coupling (8) from the pump and key (18) from the shaft (15). Unscrew the wing nuts (3) and separate the cover casing (2) from the pump casing (5), remove the impeller (12) from the shaft (15) and remove the impeller key (11). Unscrew fastening hex-head screws (19), remove the bearing cover (17) and Seeger circlip (9) locking the bearing (16); remove the shaft (15) from the impeller side. Complete disassembling by removing the bearing (16), the Gaco ring (7) and mechanical seal (6) from the pump casing (5). The mechanical seal rotating item (6) is on the shaft; in order to remove it, rotate the spring anti-clockwise and remove it with the aid of a pair of pliers.

ASSEMBLING: Check that the driving shaft is not damaged, clean it accurately, polish it by a fine abrasive cloth (grade 600) and lubricate by a neutral lubricating material (either Vaseline or silicone). On the pump casing (5), set the mechanical seal fixed part (6), the Gaco ring (7) and bearing (16) by temporarily locking it with the bearing cover (17) and fastening screws (19). Place the mechanical seal rotating item (6) by letting it slide on the shaft (15) until stop; insert the shaft (15) into the pump casing (5) from the impeller side until it strikes the seal (pay attention not to damage the seal.) Undo the screws (19), remove the bearing cover (17) and lock the shaft (15) by Seeger circlip (9); place the screws (19) and bearing cover (17) back. Arrange the impeller key (11) on the shaft (15), insert the impeller (12), place the casing cover (2), and screw the wing nuts (3). Set the key (18) and insert the coupling (8) on the shaft (15); place the pump on its housing (10) and screw fastening nuts (21).

Note: Handle the seal fixed and movable parts with care in order not to scrape contact areas.

A41 - A51



11.5 A 66 - DISASSEMBLING AND ASSEMBLING

DISASSEMBLING Disassemble the shroud (32), if any, and eccentric (33).

Separate the pump and electric motor (40) by unscrewing the hex-head screws (20). Remove the nuts (3), split the cover casing (2) and O-ring (13) from pump casing (5).

Lift the stop washer (37), unscrew the ring nut (25), remove the washer and impeller (12) from shaft (15). Remove the key (11), shim (43) and impeller spacer (31).

By means of a special hexagonal wrench (pict. 2), loosen the mechanical seal locking items (6), then remove it from the pump casing (5).

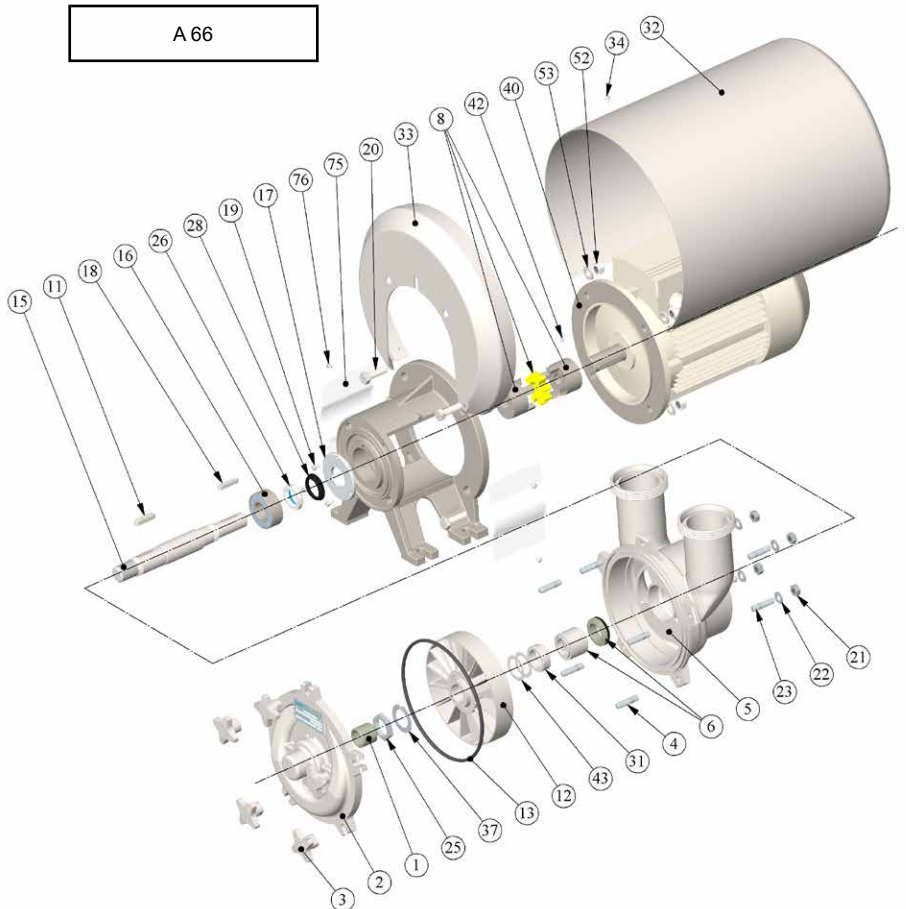
Unscrew the nuts (21) and separate the pump casing (5) from bearing housing (10). Remove the mechanical seal fixed part (6). Remove the v-ring (28) from shaft (15). Loosen the gub screws (42) and remove the coupling (8) from the shaft. Remove the screws (19) and bearing cover (17). Remove the shaft (15) from bearing housing (10). Unscrew the self-locking ring nut (26) locking the bearing (16), then remove it from shaft (15).

ASSEMBLING

Check that the driving shaft is not damaged, clean it accurately, polish it by a fine abrasive cloth (grade 600) and lubricate by a neutral lubricating (either Vaseline or silicone).

Insert the bearing (16) on the shaft (15), fasten by the ring nut, place it in its location inside the bearing housing (10), place the bearing cover (17) and fasten it by the hex-head screws (19). Insert the v-ring (28) on the shaft until it strikes against the bearing cover (17). On the pump casing (5), place the mechanical seal fixed item (6) by pressing it without scraping the surface. Assemble the pump casing (5) on the bearing housing (10) and fasten with hex nuts (21). Insert the mechanical seal rotating item (6) on the shaft (15) and let it slide on it until it strikes against the fixed item, insert the impeller spacer (31) and – pushing on the shaft stroke, fasten the mechanical seal locking items (6) with a special hexagonal wrench (pict. 2). Insert the shims (43) which are necessary in order to place the impeller with a 0.2 mm play, the key (11), impeller (12) and washer (37). Lock the assembly by the ring nut (25). Insert the O-ring (13) on the pump casing (5) and the cover casing (2) locking it by acorn nuts (3). Insert the key (18) on the shaft (15) and the coupling (8) by fastening with gub screws (42). Connect the electric motor (40) with the pump and lock with hex-head screws (20). If any, assemble the eccentric (33) and shroud (32).

Note: Handle the seal fixed and movable parts with care in order not to scrape contact areas.

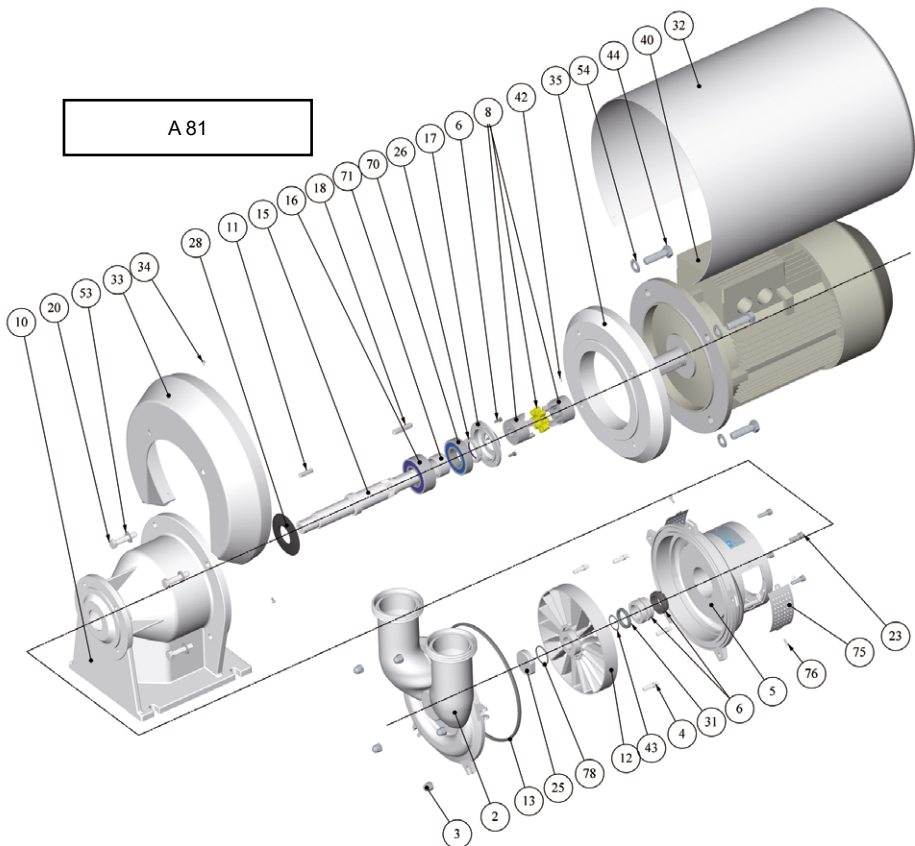


11.6 A 81 - DISASSEMBLING AND ASSEMBLING

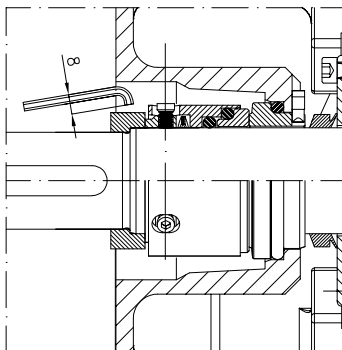
DISASSEMBLING: Disassemble the shroud (32), if any, and eccentric (33). Separate the pump from the motor (40) with reducing ring (35) (if any) by unscrewing the hex-head screws (20). Disassemble acorn nuts (3), split the cover casing (2) and O-ring (13) from the pump casing (5). Unscrew the fastening nut (25), remove the O-ring (78) and impeller (12). Remove the key (11), shims (43), and sealing spacer (31) with a special hexagonal wrench (pict. 2), loosen the mechanical seal locking items (6), then remove it from the pump body. Unscrew the socket-head screws (23) and split the pump casing (5) from bearing housing (10), then remove the mechanical seal fixed item (6) from it. Remove the thrower (28) from the shaft (15). Loosen the dowels (42) and coupling (8), then remove the key (18) from the shaft (15). Unscrew the hex-head screws (19), remove the bearing cover (17) and shaft (15) from bearing housing (10) with bearings. Unscrew the fastening ring nut (26), remove the first bearing (70), bearing spacer (71) and second bearing (16).

ASSEMBLING: Check that the driving shaft is not damaged, clean it accurately, polish it by a fine abrasive cloth (grade 600) and lubricate by a neutral lubricating (either Vaseline or silicone). On the shaft (15), assemble the double-crown ball bearing (16), bearing spacer (71) and second bearing (70). Screw the ring nut (26) and lock. Insert the shaft (15) in the bearing housing (10). Assemble the bearing cover (17) by fastening it with hex-head screws (19). On the shaft (15), insert the thrower (28). On the pump casing (5), insert the sealing rotating item (6), match it with bearing housing (10) by means of socket-head screws (23), insert the sealing fixed item (6) on the shaft (15) and let the item slide on it until it strikes with the fixed item. Add the mechanical seal spacer (39) and press it against the seal until it is aligned to the shaft. At the same time, fasten the mechanical seal (6) locking items by means of an hexagonal wrench. Insert the shims (43) in order to place the impeller with a 0.2 mm play. Insert the key (11) and impeller (12). Place the O-ring (78) in the nut (25), then screw it on the shaft (15) to lock the impeller. Insert the O-ring (13) on the pump casing (5), place the cover casing (2) and lock it by means of acorn nuts (3). Insert the key (18) in the shaft housing (15), then insert the coupling (8) and fasten it with the dowels (42). Connect the pump with the motor (40). If any, assemble the eccentric (33) and shroud (32).

Note: Handle the seal fixed and movable parts with care in order not to scrape contact areas.



Note: In A 66 - A 81 series pumps, use a smaller hexagonal wrench in order to fasten the mechanical seal locking items (pict. 2).



Pict.2

12 SPARE PARTS

RECOMMENDED SPARE PART FOR TWO YEARS OF OPERATION ACCORDING TO THE NUMBER OF PUMPS INSTALLED - VDMA STANDARD					
Denomination	Number of pumps (including reserve)				
	1	2	3	4	5
IMPELLER	1	1	1	2	2
MECHANICAL SEAL	1	2	3	4	4
PUMP BEARING (A41 - 51 - 66 - 81)	1	1	1	2	2
O-RING SEAL	2	3	5	6	7
BUSHING (A41 - 51 - 66)	1	2	3	4	5

C.S.F. Inox declines all responsibility for damage or injury resulting from the use of non-original spare parts

13 DECOMMISSIONING



Proceed as follows when dismantling the pump:

- Disconnect the electrical and fluid connections as prescribed by established standards and regulations.
 - Disassemble all the pump's components and wash them for sorted disposal, and thoroughly clean the pump's frame.
- The following materials are used in the principal components:
- Pump casing, cover, impeller, shaft, impeller nut: AISI 316L stainless steel (for special alloy pumps, refer to the bill of materials)
 - Elastomers/polymers: NBR-EPDM-FKM-FFKM-PTFE
 - Mounts and external parts: AISI 304, cast iron with corrosion proof treatment
 - Other components: composite mechanical seals, stainless steel and elastomers, ball and roller bearings
 - Motor: aluminium - cast iron – copper (refer to the manufacturer's manual for details)
 - Exhausted oil and grease

Refer to the pump's bill of materials (included with this manual) for further details on the materials of which the parts are composed.

There are no components containing asbestos, cadmium or lead, PBB or PBDE.

WARNING The user must scrap the pump in observance of local regulations.



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