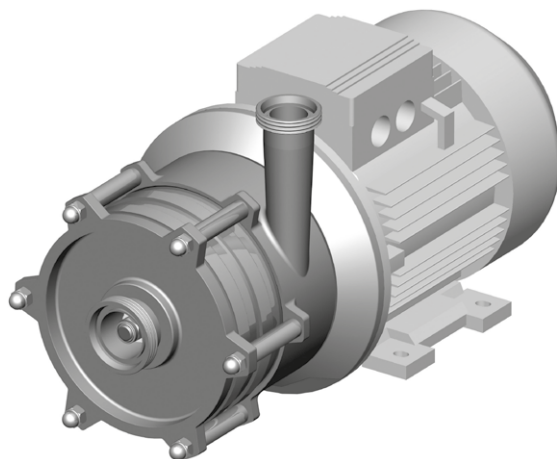


TECHNICAL SERVICE
+39 0522 869832

MULTISTAGE CENTRIFUGAL PUMPS

CV Series



**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

CSFR INOX	
Item. <input type="text"/>	
CV 83-2-25/B.T31 (*)	
N° 12345 (**)	Giri 2900
kW 18,5	Volt 400/690
	Hz 50

1 SYMBOLS

WARNING	<i>Pay the utmost attention to text blocks indicated by this symbol.</i>
	Danger: <i>failure to comply with these warnings can cause serious harm to persons and/or objects.</i>
	Danger: <i>only qualified personnel can carry out operations on the electrical part.</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 damage to persons or objects.
- Non-observance of inspection and maintenance can cause damage 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 authorization of the responsible installer.
- Installation must ensure an adequate ventilation, in order to cool the motor, 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 the motor and disconnect electric power;
 - 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 whether 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 S.p.A. 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, accidental causes and from any action carried out by the purchaser not according to the normal instructions of the manufacturer.

WARNING Before returning any item to C.S.F. Inox S.p.A. to be replaced or repaired under guarantee, inform the Customer Assistance Office about the problem and follow instructions of the manufacturer. Any item must be properly packed in order to avoid damage 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 owed by 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 placing 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 When receiving the goods, the wholeness of packing must be verified, in order to identify possible damage to the content during transportation and to claim them immediately to the carrier. Should any damage be ascertained, the following procedure must be observed:

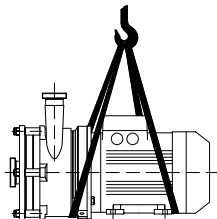
- collect the goods with reservation;
- take the necessary pictures showing the damage;
- notify the carrier of the damage undergone, by registered airmail, sending at the same time the pictures taken to show the damaged pieces.

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 gotten rid of, according to the corresponding rules in force in the 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 damage.



5 DESCRIPTION


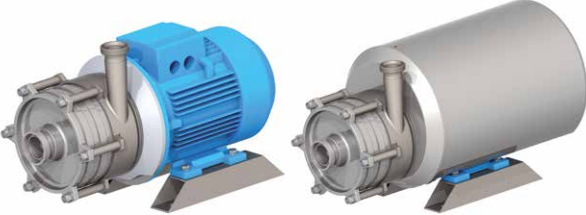
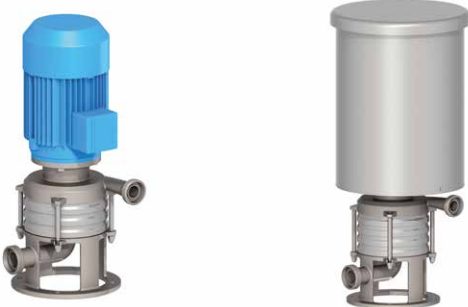
Multistage centrifugal pumps with closed impeller for medium and high heads.

Closed coupled design with closed impellers, directly mounted on to the motor shaft. The standard connections are threaded for food-grade fittings in accordance with DIN 11851 standards, and can be manufactured in shrouded version.

Suitable for industrial or foodstuffs applications where 316 stainless is necessary, but without any particular cleaning or sterility requirements. These remarkably sturdy and cost effective pumps are perfect for applications where hygiene is of low importance.

The closed impellers are not able to handle products which contain solids or highly viscous liquids. The product temperature range must be between -30°C and +140°C.

6 SETUPS

 <p>(1) (2)</p>	<p>(1) CV 11 + 18 exec. without shroud with fixed feet</p> <p>(2) CV 11 + 18 exec. with shroud with adjustable feet</p>
 <p>(1) (2)</p>	<p>(1) CV 51 + 83 exec. without shroud with fixed feet</p> <p>(2) CV 51 + 83 exec. with shroud with fixed feet</p>
 <p>(1) (2)</p>	<p>(1) CV 11 + 18 e CV 51 + 83 vertical exec. without shroud</p> <p>(2) CV 11 + 18 e CV 51 + 83 vertical exec. with shroud</p>

7 SOUND PRESSURE LEVEL

The sound pressure level of centrifugal pumps is the following (see table):

		Pump type					
Sound pressure level dB(A)	< 70	CV 11 CV 12	4-poles 4-poles				
	71+75	CV 13 CV 14	2-poles 2-poles	CV 15 CV 16	2-poles 2-poles		
	76+80	CV 17 CV 18	2-poles 2-poles	CV 52 CV 53	2-poles 2-poles	CV 71 CV 72	2-poles 2-poles
	81+85	CV 73 CV 81	2-poles 2-poles	CV 82 CV 83	2-poles 2-poles		

The measurement has been made by means of a sound level meter placed 1 m from the pump and at a height of 1.6 m from the ground.

The 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).

8 INSTALLATION

8.1 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 $h_{a\text{ geo max}}$ or the minimum allowable head $h_{c\text{ geo min}}$.

NPSH of pump (required NPSH)

The centrifugal 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.

8.2 PIPING

In order to prevent the creation of harmful strains, 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 stress 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, choosing the ones that are most suitable to avoid any formation of air pockets (Fig. 1).

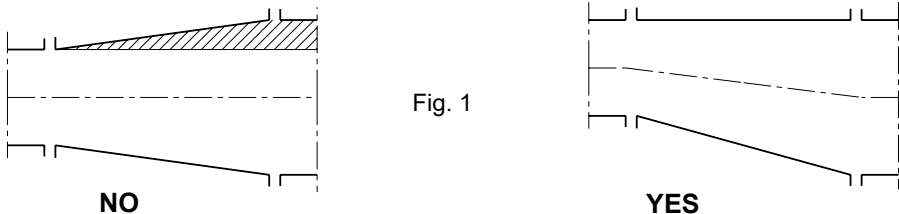


Fig. 1

The suction pipe must be as short as possible and rise as it moves towards the pump if it is sucking from a tank (Fig. 2). If on the other hand the pump is below the level of the liquid, the pipe should descend slightly (Fig. 3). 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.

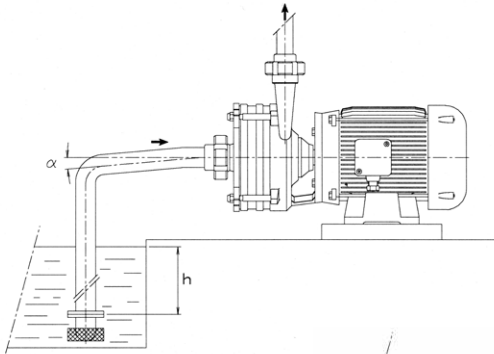
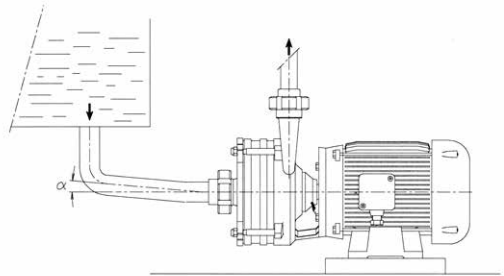


Fig. 2

Fig. 3



For this reason, when sucking from a tank located at a lower level, the pipe must reach below the free surface of the liquid. In order to prevent the formation of vortices and avoid the risk of sucking in air, always keep a minimum head at the pipe inlet (h_{min}) equal to at least the dynamic head plus a safety margin of 0.1 m (Fig.2).

$$h_{min} = \frac{Va^2}{2g} + 0,1$$

$$h_{min} = m$$

$$V = m/s$$

In order to prevent the formation of vortices when it is not possible to observe the values of minimum available head, it is possible to fit crosses in the piping. This system is suitable even for tanks with a positive head.

- 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.

8.3 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 overcurrent 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 fig.4. 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).

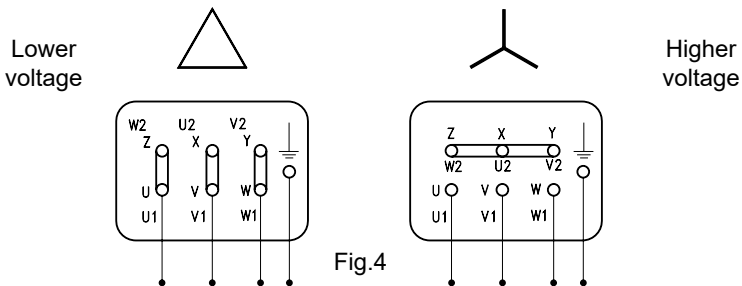


Fig.4

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.

9 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.

10 OPERATION

10.1 PRELIMINARY OPERATIONS

- Check that the pump turns freely under hand pressure.
- Check that the pump turns in the marked direction (CLOCKWISE, as seen from motor end).
- The suction pipe and the pump must be filled with liquid. There are two possible cases:
 - a) When the pump is to operate with a negative suction head, it must be primed by introducing liquid into the pump body.
 - b) When the pump is to operate below the level of the suction liquid, i.e. with a positive head, the suction and discharge gate valves must be opened until the pressure gauge on the pump discharge shows a pressure corresponding to the positive suction head.
- If the sealing chamber is to be cooled, open the cooling water supply and adjust the flow.

10.2 STARTING

- Carry out the preliminary operations, then close the discharge valve completely and make sure that the suction valve is completely open.
- Start the pump and check once again that it rotates in the right direction.

10.3 OPERATING CHECKS

- If the pump does not generate the required discharge head rapidly, stop and repeat the priming operations.
- If the discharge gate valve is opened more than necessary, i.e. further than the specified working point, and the pump is operating with a lower discharge head than that required, there will be an increase in delivered capacity and absorbed power. If this occurs, throttle the discharge until the required head and capacity values are obtained.
- If the discharge head generated by the pump is greater than that required, the diameter of the impeller can be reduced. If, on the contrary, the discharge head is lower than required, with the same capacity, it will be necessary to install a larger diameter impeller (if the one fitted is not already the largest available) and probably also a higher power motor.
- The pump must operate smoothly and without vibrations.
- Do not operate without liquid and in any case avoid prolonged operation with the discharge gate valve closed.
- Check that the suction liquid level is always sufficient to grant an adequate energy load for normal operation of the pump.
- Mechanical seal: check that there is no leakage along the shaft.

10.4 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 SPARE PARTS

11.1 REFERENCE TABLE OF MAIN PARTS SUBJECT TO REPLACEMENT

Part	Pump type	11 + 18	51 + 53 71 + 73 81 + 83
	CV		
* Mechanical seal EN2756-ISO3069		D. 24	D. 28
Pump casing "O-Ring"		OR 4625	OR 4875
Bearing		Control side	Side opposite the control side
	IEC 80	6204 - ZZ	6204 - ZZ
	IEC 90	6205 - ZZ	6205 - ZZ
	IEC 100	6206 - ZZ	6206 - ZZ
	IEC 112	6207 - ZZ	6207 - ZZ
	IEC 132 S-H	6208 - ZZ	6208 - ZZ

11.2 RECOMMENDED SUPPLY

RECOMMENDED SPARE PARTS FOR TWO YEARS OF OPERATION ACCORDING TO THE NUMBER OF PUMPS INSTALLED - VDMA STANDARDS					
Denomination	NUMBER OF PUMPS (including reserve)				
MECHANICAL SEAL	1	2	3	4	5
O-RING (quantity for each individual stage)	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.

		TROUBLE									
		A	B	C	D	E	F	G	H	I	L
POSSIBLE CAUSES AND NECESSARY OPERATIONS TO SOLVE THEM	1	●	●								
	2	●	●		●						
	3	●	●		●						
	4	●	●		●						
	5	●	●		●						
	6	●	●								
	7	●	●	●							
	8	●	●	●							
	9	●	●	●		●					
	10		●	●							
	11		●	●						●	
	12		●	●							
	13			●	●						
	14				●						
	15					●					
	16					●					
	17					●					
	18					●					
	19					●				●	●
	20					●	●	●		●	●
	21					●				●	
	22		●	●		●					
	23		●	●		●					
	24						●				
	25						●	●	●		
	26						●	●	●		
	27						●	●			
	28						●				
	29						●	●			
	30						●	●			
	31						●	●			
	32							●			
	33								●		
	34									●	●
	35									●	
	36									●	
	37									●	
	38										●
	39										●

WORKING IRREGULARITIES

We are herewith listing some of the possible working irregularities which may occur using the pumps, with a table helping to find out the possible causes and how to solve the problem.

Trouble:

- A) The pump does not run
- B) The delivery is not sufficient
- C) The pressure is not sufficient
- D) The pump stops priming
- E) Power absorption too high
- F) Leakages from the mechanical seal
- G) Short life of the mechanical seal
- H) Failure of the mechanical seal
- I) Anomalous vibrations and/or noise
- L) Short life of bearings

Possible causes and necessary operations to solve them:

- 1) The pump is not properly primed.
 - Repeat the priming.
- 2) Air entering from suction connections.
 - Check the lock.
- 3) Air entering from the mechanical seal.
 - Replace the mechanical seal or arrange a solution with a vacuum spring in case of vacuum suction operation.
- 4) Obstructions present along suction pipes or valves closed along pipes.
 - Verify and remove all foreign matter from pipes and finally verify valve status (if closed, open them).
- 5) NPSH available in the plant is lower than NPSH needed by the pump.
 - Reduce the friction loss or adjust the pump at a lower delivery point.
- 6) Defective operation of the standing valve (not flooded pumps).
 - Restore the proper operation of the valve or replace it with a perfect one.
- 7) Plant friction losses higher than pump performances.
 - Reduce friction losses or replace the pump with a more suitable one for requested performances.
- 8) Opposite direction of rotation or too low velocity (in case of a pump operated by an inverter).
 - Restore the correct direction of rotation; increase the motor speed.
- 9) The impeller is clogged by foreign matter (in case of pump with closed-impeller).
 - Remove foreign matter from the impeller.
- 10) Worn mechanical seals.
 - Replace worn parts.
- 11) Worn or partially clogged impeller.
 - Replace the impeller or remove foreign matter.
- 12) Product viscosity higher than foreseen.
 - Verify the pump size.
- 13) Presence of too much gas in the fluid.
 - Fit an air relief valve.
- 14) Plant friction losses lower than foreseen.
 - Increase friction losses or adjust the pump at a higher working point.
- 15) Fluid specific gravity higher than foreseen.
 - Increase the installed motor power.
- 16) Pumped fluid too viscous.
 - Verify the pump size.
- 17) Higher pump delivery during operation due to plant friction losses lower than foreseen.
 - Adjust the pump at a lower working point or increase the plant friction losses.
- 18) Rotation speed too high (when pump is controlled by an inverter).
 - Reduce the velocity.
- 19) Internal frictions caused by slipping between rotating and fixed parts.
 - Restore normal assembly conditions.
- 20) Misalignment of pump-motor or deformed shaft.
 - Restore the correct alignment between pump and motor; replace the shaft with a new one.
- 21) Damaged bearings of pump or motor.
 - Replace the bearings.
- 22) Electric misconnection.
 - Modify the electric connection by strictly following ratings written on the motor plate according to the available voltage.
- 23) Voltage not suitable for the installed motor.
 - Replace the motor with one having a suitable voltage.
- 24) Mechanical seal worn.
 - Replace the mechanical seal.

- 25) Pump fluid or temperature not suitable for the assembled mechanical seal or its parts.
 - Verify the mechanical seal selection.
- 26) Non-cleaning when using fluids which tend to crystallize.
 - Increase washing cycles and don't leave the product inside the pump for a long time.
- 27) Misassembly of the mechanical seal.
 - Assemble the mechanical seal again with attention.
- 28) Opposite rotation direction for non-reversible mechanical seals.
 - Restore the correct direction of rotation.
- 29) Flushing non sufficient for external flushed seals.
 - Increase the flushing fluid.
- 30) Dry operation of the pump.
 - Arrange the proper dry-running protection in order to avoid the problem.
- 31) Oscillations on the shaft due to a too high assembly allowance, worn bearings, etc.
 - Restore normal assembly conditions by replacing the worn pieces.
- 32) Suspended solid parts in the fluid.
 - Verify the mechanical seal selection.
- 33) Too high temperature or thermal shock.
 - Increase gradually the fluid temperature by avoiding instantaneous thermal amplitudes; prevent the pump from dry-running.
- 34) Out-of-balance of the impeller.
 - Replace the impeller.
- 35) The pump runs at a low flow rate.
 - Adjust the pump at a higher working point.
- 36) The pump runs at a high flow rate.
 - Adjust the pump at a lower working point.
- 37) Pump and/or pipes are not properly anchored.
 - Verify and adjust anchorage of the involved parts.
- 38) Bearings not lubricated (where lubrication is foreseen).
 - Replace bearings and restore their proper lubrication, which must be topped up from time to time according to work conditions.
- 39) Water seepage due to worn oil retainers.
 - Replace worn parts.

13 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 taking the machine 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.

14 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
 - 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.

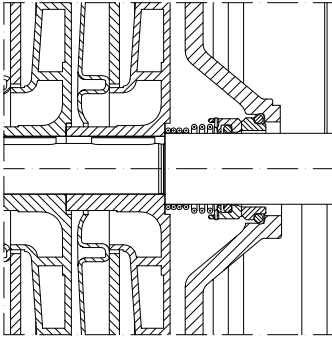
WARNING The user must scrap the pump in observance of local regulations.

15 SEALS

All C.S.F. centrifugal pumps of the CV series are fitted with unified mechanical seals according to EN 12756 - ISO 3069 standards, in order to grant the interchangeability (subject to verification of axial space). The type of mechanical seal and material are chosen according to the liquid to be pumped. A mechanical seal is a device intended to retain fluid and prevent it from escaping from the pump. The seal consists of two sliding surfaces, with one rotating relative to the other, held in axial contact by the pressure generated by the fluid (hydraulic force) and by components such as springs or bellows (mechanical force).

Mechanical seals are generally cooled by the fluid itself. The materials used are selected in relation to the characteristics of the fluid used, the operating conditions in which the seal is installed and the performance required. Seals installed on CV pumps may either permit only one direction of rotation or be reversible: the direction of rotation of the pump is always indicated by an arrow.

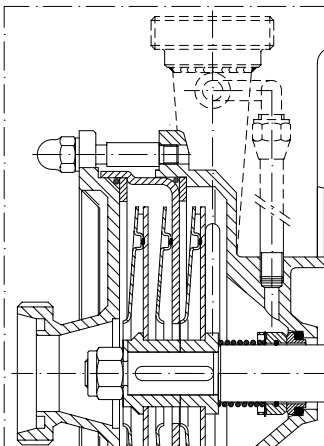
WARNING Before using the pump for any liquids other than those specified when selecting and ordering, ensure that mechanical seals and gaskets are suitable for the new product. Different types of seal are available with CV pumps:



EXEC. "T"

STANDARD MECHANICAL SEAL "T"

The seal is installed on the interior of the pump casing and immersed in the product for better cooling and increased durability of the seal itself.



EXEC. "W"

MECHANICAL SEAL WITH "W" CIRCULATION

Internal mechanical seal with forced circulation of the pumped liquid to restrict the working temperature, to eliminate air and steam bubbles, to improve lubrication and avoid residues or deposits on the seal.



16 DISASSEMBLY

16.1 DISASSEMBLY OF CV 51-52-53 / 61-62-63 / 71-72-73 / 81-82-83 SERIES PUMPS

To access the internal parts it is necessary to unscrew the nuts (38) and slide out the tie rods (36).
Take off the suction cover (7).

Unscrew and remove the impeller nut (14).

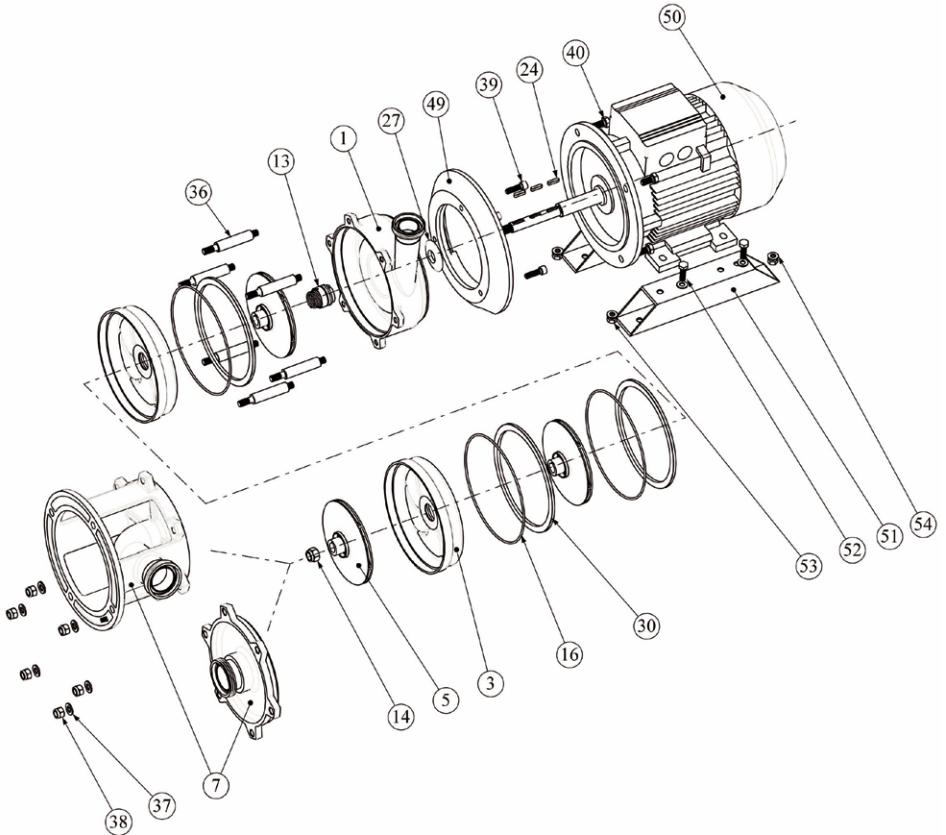
The first impeller will come off (5) and can slide off the shaft, followed by the middle casing (3), the O-ring (16) and the seal pressure ring (30).

Proceed with the following stages.

Dismantle the last impeller to reach the mechanical seal (13).

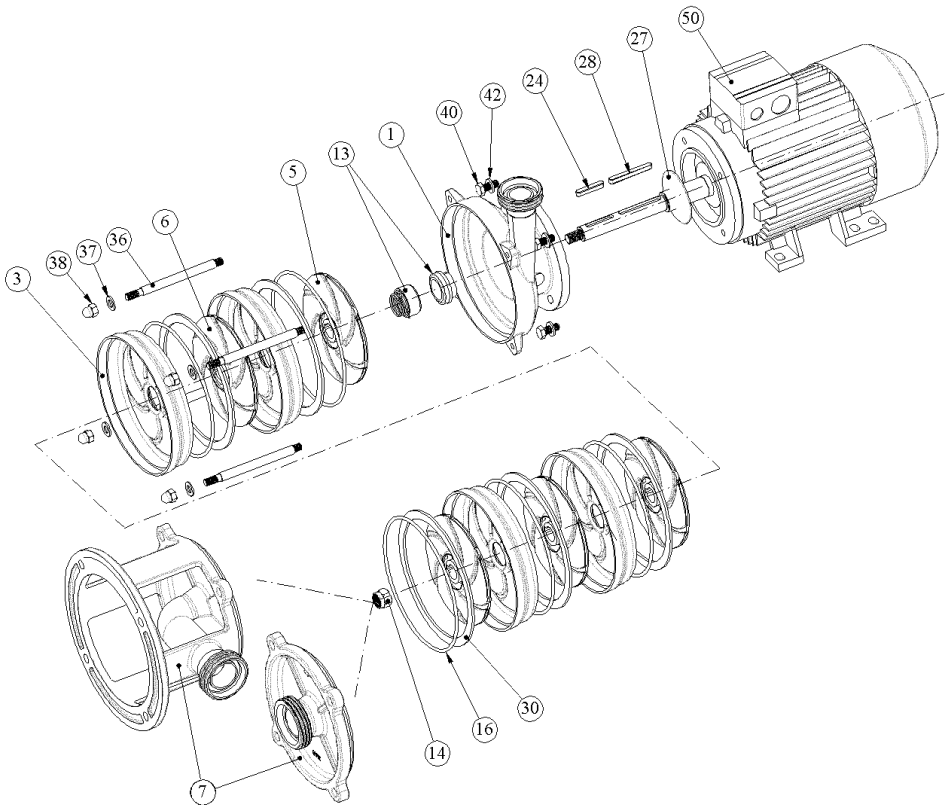
To slide it off the shaft, first remove the keys (24). Proceed by removing the screws (40) that hold the pump casing (1) and the flange (49) onto the motor, so that they can be dismantled.

Separate the fixed part of the seal (13) from the pump casing. Examine the O-rings (16) to see if they need replacing.



16.2 DISASSEMBLY FOR CV 11 ÷ 18 SERIES PUMPS

To access the internal parts it is necessary to unscrew the nuts (38) and slide out the tie rods (36). Take off the suction cover (7), the O-ring (16) and the seal pressure ring (30). Unscrew and remove the impeller nut (14). The first impeller will come off (5) and can slide off the shaft, followed by the middle casing (3), the O-ring (16) and the seal pressure ring (30). Proceed with the following stages. Dismantle the last impeller to reach the mechanical seal (13). To slide it off the shaft, first remove the keys (24-28), until there is only one key left on CV 15. Proceed by removing the screws (40) that hold the pump casing (1) onto the motor, so that it can be dismantled. Separate the fixed part of the seal (13) from the pump casing. Examine the O-rings (16) to see if they need replacing.



17 CLEANING PROCEDURE

The cleaning of stainless steel pumps depends on the process liquid.

Typically the cleaning process should be developed by a plant responsible of sanitization.

C.S.F. Inox recommends a fluid velocity between 1,5-3 m/s, with rinsing water and chemical agent like alkaline detergent and acid.

Chemicals like hypochlorite and chlorine must be avoided because stainless steel could be damaged by corrosion.

Alkaline detergent:

A sodium hydroxide/water solution may be used at concentration 1-3% at a temperature of 70-90°C; a surfactant could be added to increase the rinse cleaning.

Acid solution:

It is used to neutralize alkaline residual and for the passivation of the stainless steel surface; a solution of nitric acid at 1-2,5% could be used at ambient temperature up to 45°C.

Other acid solution could be: citric acid and water (0,5-3% at 70°C) and phosphoric acid at 0,5% with a temperature up to 45°C (with inhibitor of corrosion).

Suggested cleaning process:

- 1) Prerinse with cold water (15-25°C) for 10-15 minutes to remove any residue.
- 2) Warm prerinse with water at 45-60°C for 10 minutes.
- 3) Rinse with alkaline solution at 70-95°C for 20-30 minutes.
- 4) Intermediate rinse with water (warm or cold) up to 60°C for 5-10 minutes.
- 5) Rinse with acid solution like nitric acid for 10 – 15 minutes at ambient temperature.
- 6) Final rinse with cold water for 10-15 minutes or until any traces of cleaning agent have been removed.

Caution:

- 1) During the CIP process there are thermal expansion: take care that there are not rapid temperature variation.
- 2) Chemical agents at high temperature can cause potential health risk: respect the safety regulation and use protection devices
- 3) Control the concentrations and temperature of chemical agents during the CIP.
- 4) Store the cleaning agents in compliance with the safety regulations

Sterilization:

If requested, a sterilization can be carried out by means of hot water or steam; the pump must be stopped during the sterilization process with steam. See the admissible temperature for sterilization depending on gasket compound.

Temperature limits for rubber gasket	Steam/hot water	Chemical bactericidal
EPDM	121°C	82°C
FPM/FKM	149°C	82°C

Impeller nut cleaning and sterilization:

- 1) The dismantled nut should be cleaned before assembling (internal threads).
- 2) Clean the nut with Ultrasound washing system or detergent and rinsing with clean water.
- 3) Sterilize the nut with steam at 143°C for 30 minutes in autoclave or using chemicals solution (i.e. glutaraldehyde solution). Do not use chlorine solutions because stainless steel could be damaged by corrosion.



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