CSF

SCREW CENTRIFUGAL PUMPS CR SERIES

CSF SANITARY CENTRIFUGAL SCREW PUMP CR

Instructions for assembly, installation, operation and maintenance

Colly FLOWTECH

Översättning av bruksanvisning original

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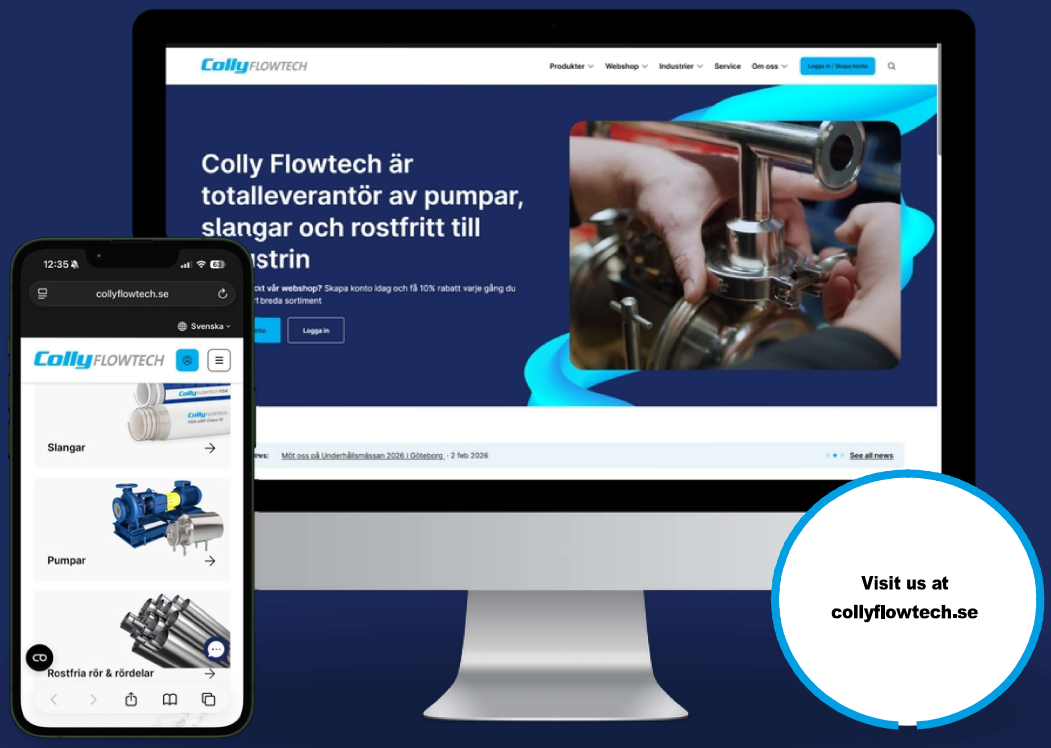

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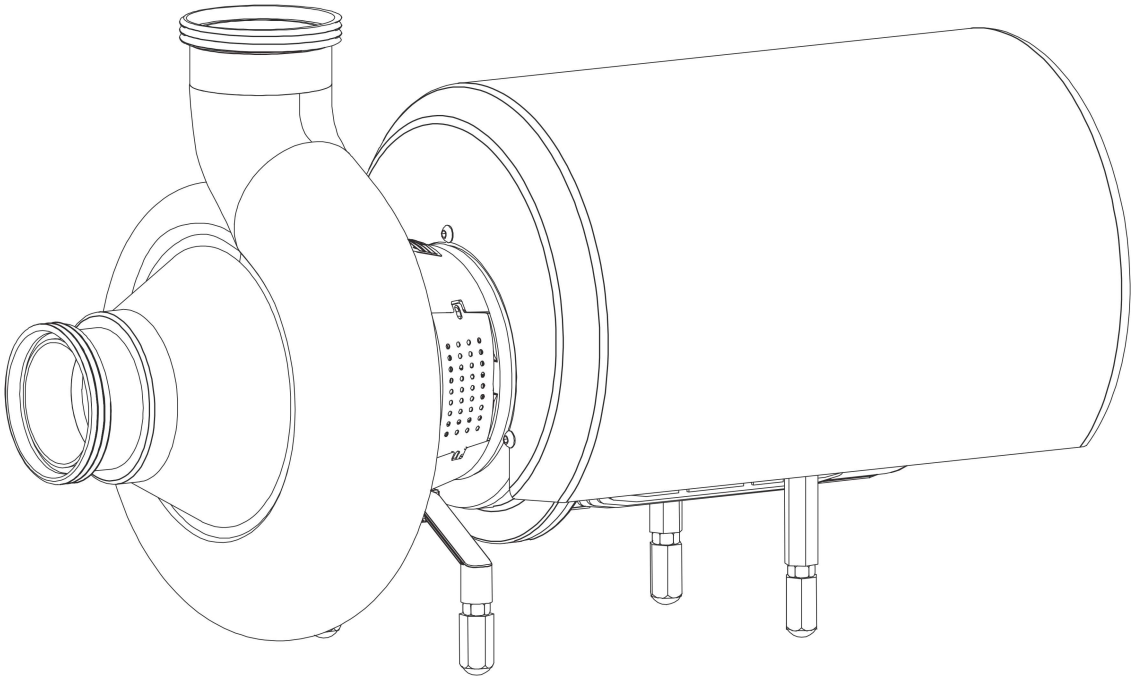
CENTRIFUGAL PUMPS
CR series



INSTRUCTIONS FOR ASSEMBLY, INSTALLATION,
OPERATION AND MAINTENANCE

CSF

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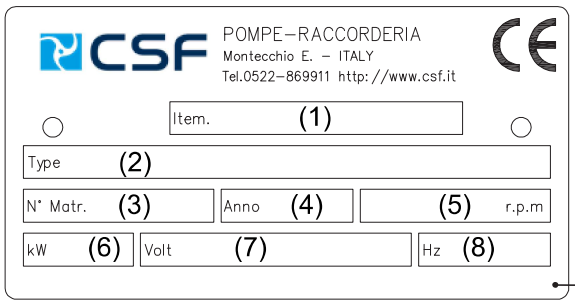
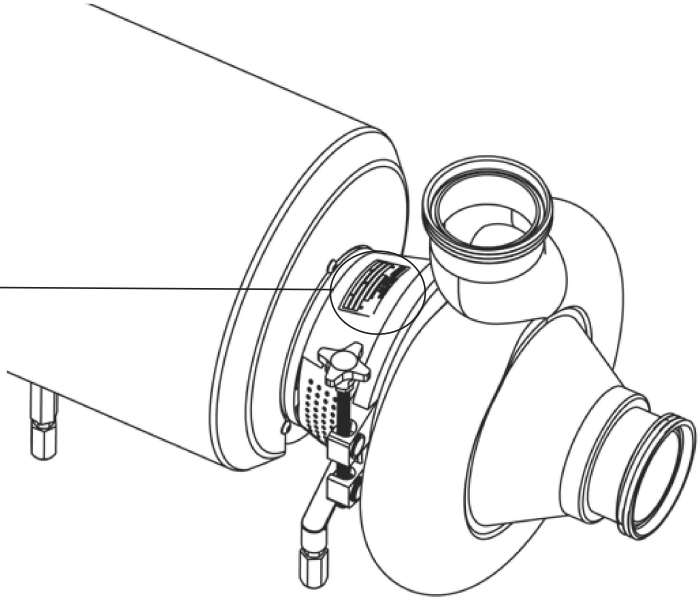
FOREWORD

This instruction manual is designed to provide the user with all the information needed to perform all use and maintenance activities concerning the pump throughout its entire service life.
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 (2) and serial number (3) in order to ensure fast and efficient service: the complete code is given on the plate and in the purchase documents.
This manual refers exclusively to the pump supplied.

CSF Plate example





1. System item provided by the client
2. Manufacturing series, size and execution
3. Serial number
4. Year of construction
5. Pump rotation speed
6. Installed power in kW
7. Motor voltage
8. Motor frequency

1.0 - SYMBOLS

	Pay great attention to the text parts indicated by this symbol.		Compulsory foot and hand protection PPE: gloves and safety shoes
	Danger: the non-observance of instructions can cause serious damages to persons and/ or objects.		Compulsory respiratory tract PPE: mask
	Danger: only skilled personnel is allowed to carry out operations concerning the electric parts.		Danger: hot surfaces

2.0 - SAFETY WARNINGS

The pumps supplied are designed for professional use and are not intended to come into contact with the general public and minors.
Operators and maintenance personnel must read and comprehend the instruction manual.
Maintenance personnel must have adequate training and qualifications to carry out maintenance operations in compliance with safety standards.
Trainees may only carry out activities under the supervision of qualified, expert personnel.

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.

- 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.

- 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 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.

2.1 - SAFEGUARDS

Inspect the condition of the guards and relative fasteners on a regular basis (at least every 12 months).
If the guards are damaged, worn or have been removed or if the fastening devices have been removed or come loose, the user must immediately restore the condition of the guards and relative fastenings.

3.0 - 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 repaires 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.

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 occured, must accompany the returned item/s.

Any item with a presumed fault should be returned to C.S.F. Inox S.p.A. at the customer's expense, accompanied by a Declaration of Decontamination (attached to page 29), unless otherwise agreed.
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.
C.S.F. Commercial parts incorporated in C.S.F. Inox products are guaranteed by their corresponding manufacturers.

4.0 - 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

By goods receiving, the wholeness of packing must be verified, in order to identify possible damages to the content occured 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 - INSTALLATION SITE PREPARATION

It is the user's responsibility to:
- prepare the installation sites as prescribed by local legislation governing health and safety in the workplace.

- Make sure the electrical power supply is compliant with the legislation in force and possesses an efficient earthing system.

LIGHTING

The machine installation site must have adequate natural and/or artificial lighting in compliance with the legislation in force in the country of installation.
Lighting must be uniform, guarantee good visibility in every part of the machine and must not create hazardous reflections. It must also be such that commands on the control panels and emergency stop buttons can be clearly seen.

4.4 - TRANSFERRING

The personnel involved must have adequate qualifications and experience in handling and lifting operations.
Use suitable and certified equipment for lifting and handling the machine supplied.

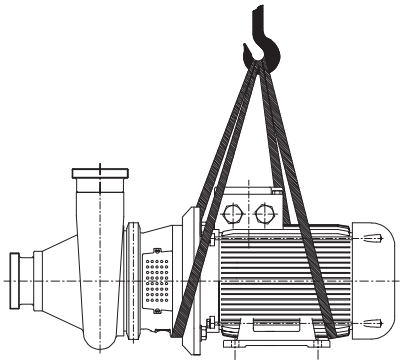
Carry the packed pumps as close as possible to the place of installation by means of appropriate lifting devices and unpack them. During this operation take care, as unsteady parts could fall down.

The material used for packing should be properly disposed of, according to the corresponding rules in force in receiver's country (see heading 17 on page 30).

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.

Observe the health & safty regulations in force locally.



5.0 - RETURN

- Empty the pump correctly.
- Wash and thoroughly clean the pump, especially in the case of harmful or explosive liquids.
- Thoroughly dry the pump.
- A duly compiled Declaration of Decontamination must accompany the pump (see page 29).

6.0 - DESCRIPTION

The CR series are single-stage centrifugal pumps with axial suction port and a specially designed screw impeller.
Made from AISI 316 stainless steel with standard cast finish.
All models have threaded connections for fittings to DIN 11851 standards (unless otherwise requested) and all models are fitted with mechanical seals. The materials used for the components and the mechanical seal are chosen according to the liquid to be pumped. They are fitted with three-phase electric motors, IP 55 protection rating, unless otherwise specified.
With the CR pumps the problem of clogging by solid or thick fluids is eliminated. CR pumps are suitable for food and beverage operations for pumping fluids with solids without maceration of the product.

6.1 - TECHNICAL DATA

- Maximum operating pressure: 10 bar up to 100°C
- Operating temperature range: -10°C - +100°C (100°C up to 120°C with increased clearance)

The temperature use range is determined by the type of mechanical seal and the material of the elastomers installed.
f there is any need to use the pump with different performance data and product characteristics to those indicated at the time of ordering, contact C.S.F. Inox S.p.A. to make sure the pump is suitable for your requirements.

6.2 - SOUND PRESSURE LEVEL

The sound pressure level of CR centrifugal pumps is the following:

		PUMP TYPE	
Noise index dB(A)	< 70	CR 65	4-pole 6-pole
	71 ÷ 75	CR 80 CR 100	4-pole 6-pole
	76 ÷ 80	CR 125	4-pole 6-pole

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).

7.0 - 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.

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. .

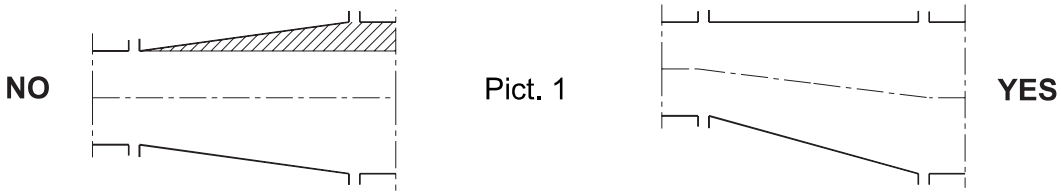
8.0 - INSTALLATION

8.1 - SUCTION AND INFLOW CONDITIONS

(NPSH = Net Positive Suction Head)
NPSHa (NPSH available)
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 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.
NPSHr (required 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.

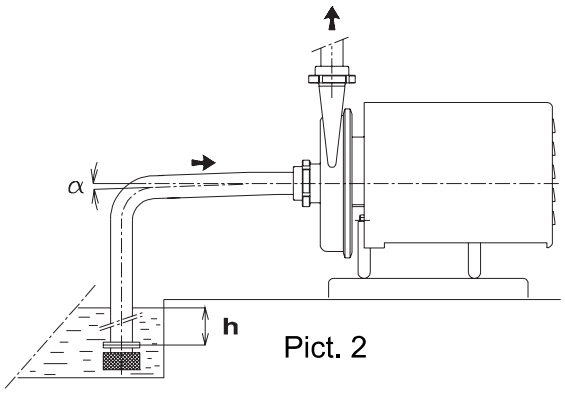
8.2 - PIPING

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

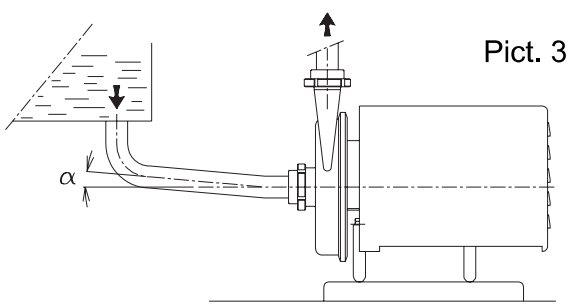


Pict. 1

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



Pict. 2



Pict. 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 (Pict.2).

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

hmin = m

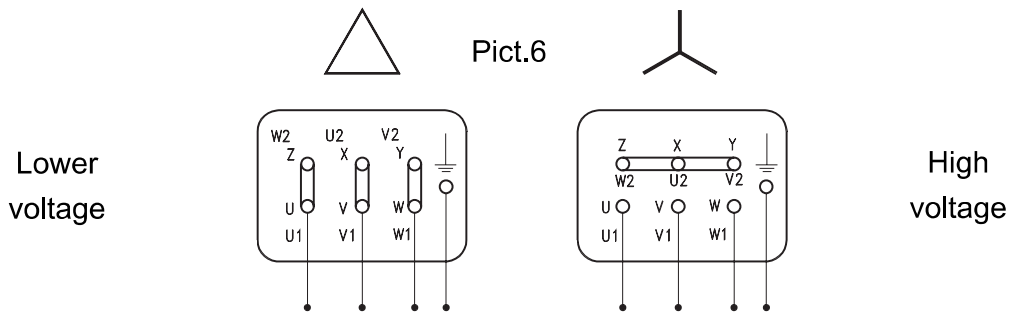
V = m/s

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.
During electro-welding work never use the pump as an earthing point and make sure the current does not flow through the bearings.
Before using the pump, make sure the tank and piping are clean and examine the inside of the pump before connecting the piping.

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 pict.4; when starting, the motor's current absorption increases briefly to 5-6 times the nominal value. If the mains supply is unable to substain this increase in absorption, use a star-delta starter or other kind of device (e.g. an autotransformer).

Pict.6



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.

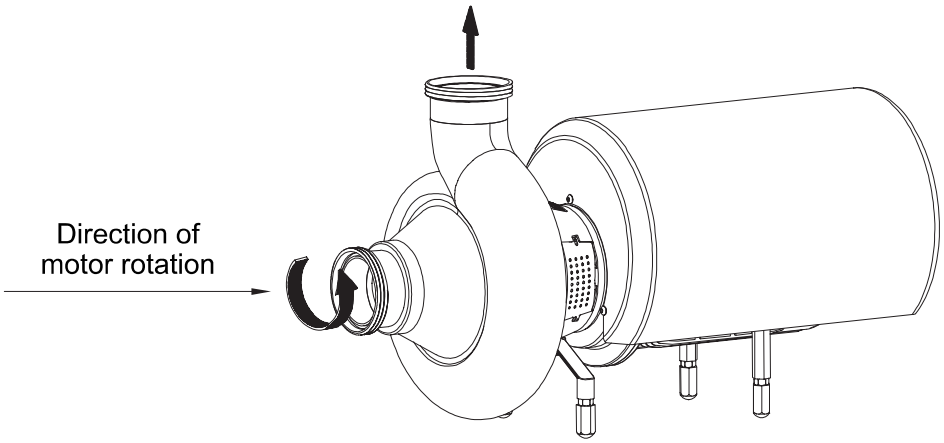
9.0 - OPERATION

9.1 - PRELIMINARY OPERATIONS BEFORE START-UP

- Check that the pump turns freely under hand pressure
- The clamp joining the pump casing and the lantern bracket must be well tightened and it should not be easily unscrewed by hand.

The clamp must be tightened using a wrench and NOT simply by hand.

Check the that the pump turns in the marked direction as described in the figure (**clockwise** as seen from the pump side).



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.

c) If the sealing chamber is to be cooled, open the cooling water supply and adjust the flow.

- After carrying 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.

9.2 - OPERATING CHECKS

- If the pump does not generate the required discharge head rapidly, stop and repeat the priming operations.
- If the delivery 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.
- 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.

9.3 - 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.

9.4 - 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.
For correct cleaning of the pump, please see the washing procedures described in heading 16 on page 27.

10.0 - SPARE PARTS

10.1 - REFERENCE TABLE OF MAIN PARTS SUBJECT TO REPLACEMENT

Pump size CR / Detail		CR 65	CR 80	CR100	CR 125
* Mechanical seal EN12756-ISO3069		Ø28		Ø43	
Casing O-ring		OR 215	OR 6670	OR 6795	OR 6995
Bearing	IEC 80	3208 A 2RS-C3		---	
	IEC 90				
	IEC 100	3208 A 2RS-C3			
	IEC 112				
	IEC 132	---	3210 A 2RS-C3		
	IEC 160	---		3214 A C3	
Sealing ring	IEC160	---		AS 80x100x10	

*<u>**NB: The type and materials of the seals are identified in the enclosed technical parts list**</u>

10.2 - RECOMMENDED SUPPLY

RECOMMENDED SPARE PARTS FOR TWO YEARS OF OPERATION ACCORDING TO THE NUMBER OF PUMPS INSTALLED - VDMA STANDARDS					
NAME	NUMBER OF PUMPS (including reserve)				
	1	2	3	4	5
MECHANICAL SEAL	1	2	3	4	4
CASING O-RING SEAL	2	3	5	6	7
BEARING	1	2	3	4	4
GACO RING (for power ratings of 11 kW and over)	1	2	3	4	4

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

11.0 - 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) Insufficient flow rate
C) The pressure is not sufficient
D) The pump stops priming
E) Power absorption too high
F) Leaks from mechanical seal
G) Short life of the mechanical seal
H) Failure of the mechanical seal
I) Anomalous vibrations and/or noise
J) 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.

POSSIBLE CAUSES AND NECESSARY OPERATIONS TO SOLVE THEM	PROBLEM ENCOUNTERED									
	A	B	C	D	E	F	G	H	I	L
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										●

12.0 - SEALS

All C.S.F. pumps of the CR 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.

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.

MATERIAL CODES

METALS

H - chrome-nickel stainless steel AISI 304
X - Stainless steel Inox AISI 316L
L - Hastelloy (Ni based alloy)

ELASTOMERS

6- Nitrile (NBR)
7 - Ethylene propylene (EPDM)
Y - Fluorocarbon (FPM)
B - Silicone
U - Kalrez

RESINS

5 - Normal PTFE
4 - Loaded PTFE
F - O-RING FEP

METAL OXIDES

2 - Alumina ceramic

CARBONS

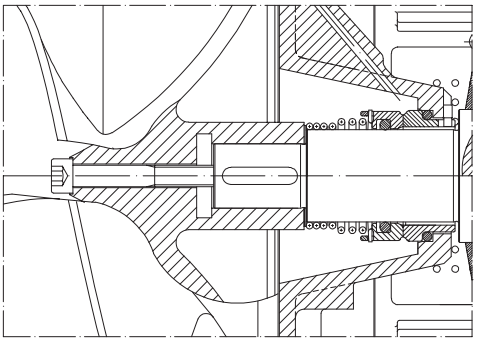
V - Normal carbon
Z - Special carbon

METAL CARBONS

3 - Hard metal welded on stainless steel (TUC)
R - Integral anti-corrosion hard metal (TUC)
K - Integral silicate carbon (SIC)

12.1 - SINGLE MECHANICAL SEALS

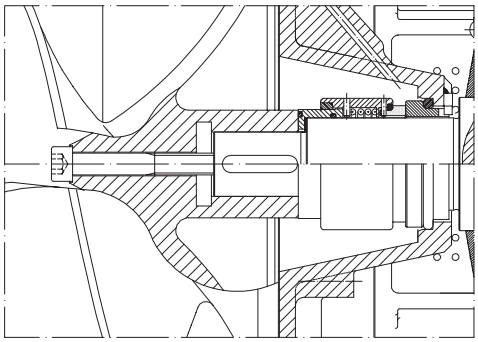
EXECUTION T / W



STANDARD MECHANICAL SEAL "T"
Standard execution foresees the assembly of an submerged internal mechanical seal on the product, housed behind the impeller in a specific tapered chamber so as to guarantee correct lubrication conditions.

MECHANICAL SEAL WITH CIRCULATION "W"
Internal mechanical seal with circulation forced by the pumped liquid.

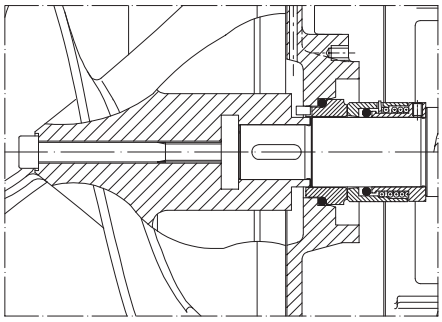
EXECUTION WH



INTERNAL MECHANICAL SEAL "WH"
Protected and balanced. It is easy to clean and therefore ideal for sanitary, pharmaceutical use etc.

W= Internal mechanical seal with circulation forced by the pumped liquid.

EXECUTION Y

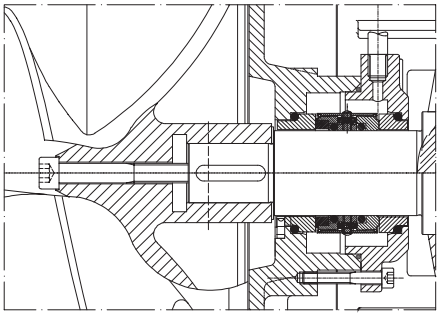


EXTERNAL MECHANICAL SEAL “Y”

For all cases where the mechanical seal must not touch the pumped product, in order to avoid sanitary problems, corrosion and conditioning of its running.

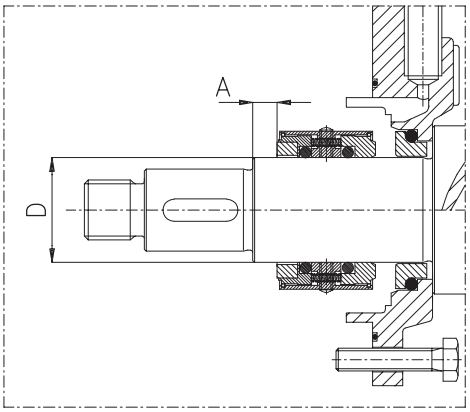
12.2 - DOUBLE MECHANICAL SEALS

EXECUTION Q



COMPACT DOUBLE MECHANICAL SEAL “Q”

Double mechanical seal with circulation of washing and cooling liquid. The function of flushing is that of cleaning, lubricating and cooling the seal; the liquid in circulation must be clean. If the seal is leaking, the flushing liquid will point out this fault.



A = ASSEMBLY MEASUREMENT

D (mm)	AT (mm)
28	8
43	20.5

Tab. 1

"Q" Exec. mechanical seal auxiliary flushing

At first start up, the filling of the pump must be guaranteed. Furthermore, you must guarantee the full filling of the auxiliary systems, if present, such as the lubrication circuit of the external dual seal.
Lack of compliance with the present requirements causes the dry operation of the pump and of the mechanical seal; consequently the mechanical seal can be overheated and damaged.
The auxiliary service (optional) consists in flushing for the mechanical external dual seal.
The following conditions are recommended:

Ø Mechanical seal	Ø Flushing tubes	Speed	Flow rate l/min	Pressure bar
Q 2nd Gr. Ø 28	Ø 1/8" Gas male	1450	0.5-1.0	See seal instructions
Q 3rd Gr. Ø 43	Ø 1/8" Gas male	1450	0.7-2.0	See seal instructions

Exec."Q": in case of leaks from the process seal (pump side) the flushing liquid comes into contact with the pump fluid; always use a flushing liquid that is compatible with the process liquid.
The flushing must be arranged with a pressure value of 0.5 ÷ 1 Bar higher than the pressure foreseen at the suction, in order to have the right compensation.
The mixing of incompatible liquids can cause strong exothermic reactions with the development of heat.
In the presence of dangerous liquids and /or use of flushed seals the presence of the flushing liquid must be monitored by means of a system that can intervene to stop the pump in case of flushing liquid absence.
In the presence of liquids dangerous to health and/or the environment, it is advisable to insert a monitoring device of the seal flushing liquid that can intervene to stop the pump or as an alarm sign, in case of contamination of the flushing liquid.
Operation checks
Verify the presence of flushing of the mechanical seal.
Verify the absence of leaks from the auxiliary service connections of the seal (if present).

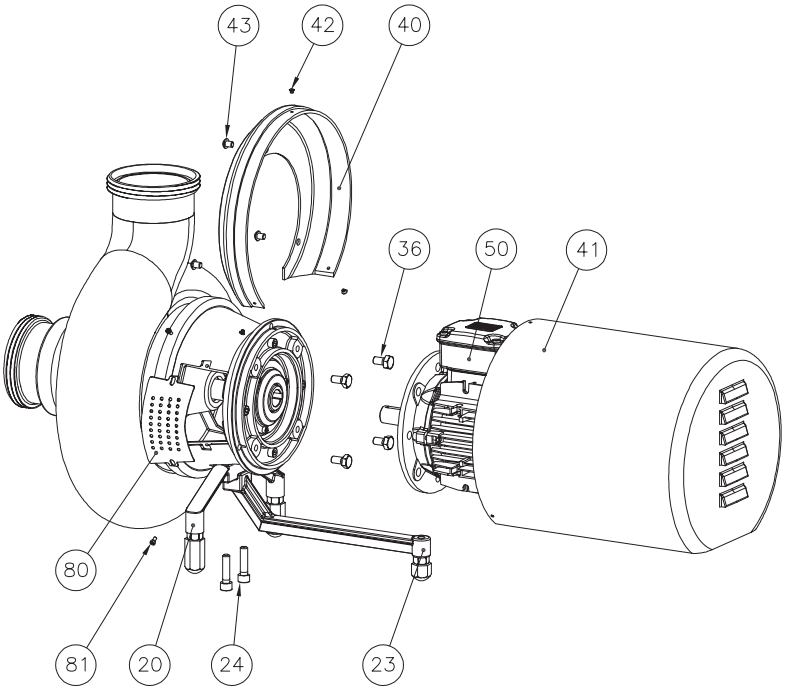
Flushing liquid requirements

The flushing liquid must be compatible with the liquid being pumped.
It is advisable to use one of the following liquids:
- Water with electrical conductivity of 100 ÷ 800 µs/cm
- Water and glycol mixture
- Glycerine

13.0 - PUMP DISASSEMBLY

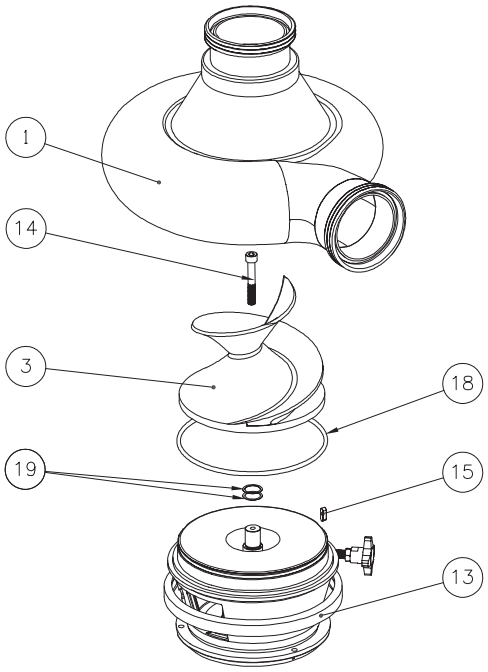
13.1 - DISASSEMBLY OF PUMP "T/W" EXEC. (Version with single mechanical seal)

1. Remove the screws (42-81) to disassemble shroud (41) and protections (80). Now free the motor (50) by unfastening the screws (36) and extract the pump.
   Disassemble the front and rear foot (20-23) with the screws (24).

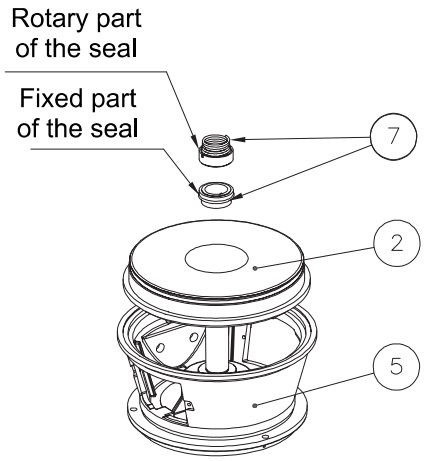


N.B.: THE FOLLOWING OPERATIONS MUST BE CARRIED OUT PLACING THE PUMP UPRIGHT

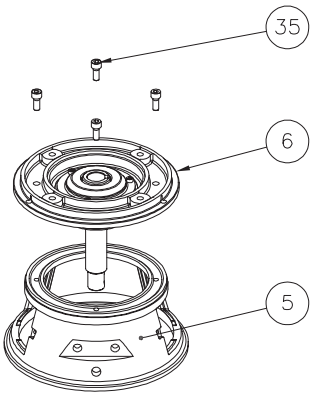
2. Loosen the clamp (13) to extract the pump casing (1), undo the screw (14) and take out the impeller (3).
   Remove the tab (15) from its seat, the shims (19) which create the assembly allowance of the impeller and extract the O-ring (18).



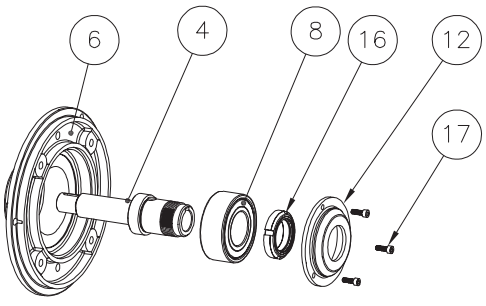
3. Extract the rotary part of the mechanical seal (7) turning the spring anti-clockwise. Separate the cover (2) from the lantern bracket (5), pull off the fixed part of the mechanical seal (7) housed on it.



4. Turn the pump over to access the screws (35) which allow you to separate the support (6) from the lantern bracket (5).

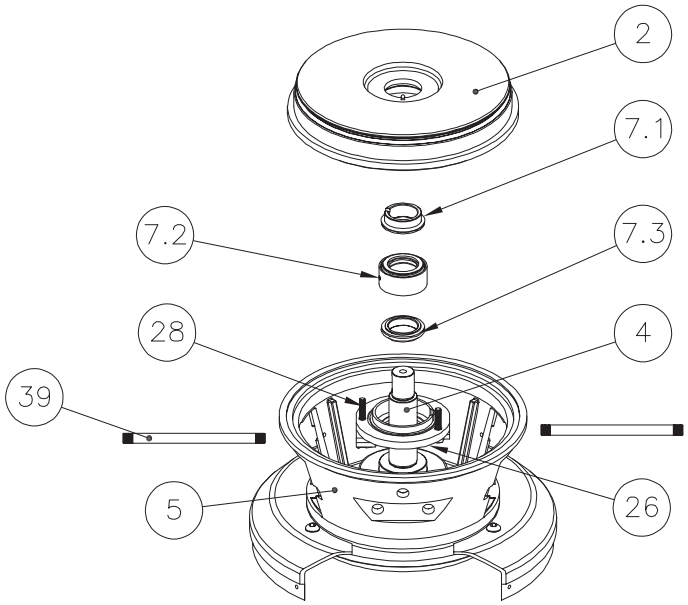


5. Remove the bearing cover (12) pulling off the screws (17); extract the shaft (4) - bearing (8) -ring nut (16) unit from the support (6): unscrew the ring nut (16) and extract the bearing (8) from the shaft (4).



13.2 - DISASSEMBLY OF PUMP "Q" EXEC. (Version with double mechanical seal)

1. Perform the operations 1 - 2 as in the previous heading 13.1.
2. After having disassembled the flushing pipes (39) separate the seal box cover (26) from the cover (2) by unscrewing the screws (28). Pull the cover (2) from the lantern bracket (5). Disassemble the seal (7): The internal fixed part is housed inside the cover (2), so they just need to be separated; after having loosened the fixing dowels, pull the rotating part (7.2) from the shaft (4), and disassemble the external fixed part (7.3) from the seal box cover (26).



3. Perform the operations 4 and 5 as described in the previous heading 13.1.

14.0 - PUMP ASSEMBLY

14.1 - ASSEMBLY OF PUMP "T/W" EXEC.

Observing the positioning of the seals as described in paragraph 12.1, carry out the assembly operations in reverse order in relation to the previous chapter, heading 13.1, thus obtaining the sequence of steps needed to assemble the pump.

NB: Refer to the table (heading 14.3) to observe the assembly allowances.

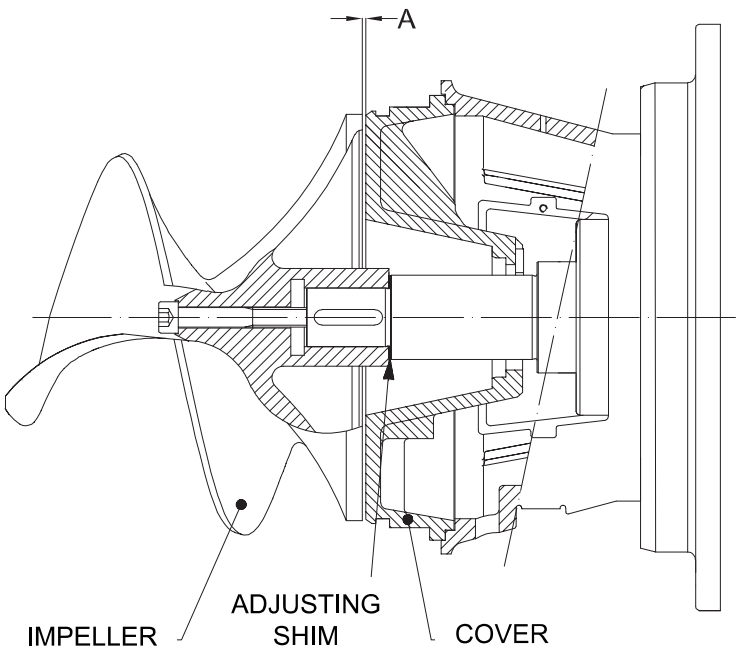
14.2 - ASSEMBLY OF PUMP "Q" EXEC.

Observing the positioning of the seals as described in paragraph 12.2, carry out the disassembly operations in reverse order in relation to the previous chapter, heading 13.2, thus obtaining the sequence of steps needed to assemble the pump.
N.B.: Refer to the table in heading 14.3 for impeller assembly allowances and table 1 in heading 12.2 for mechanical seal assembly measurements.

14.3 - IMPELLER - COVER ASSEMBLY ALLOWANCE

The value **A** refers to the impeller/cover assembly allowance created with the adjusting shims (pos. 19).

PUMP TYPE	A (mm)
CR 65	0.4
CR 80	2.5
CR 100	1.5
CR 125	2



15.0 - BEARINGS MAINTENANCE

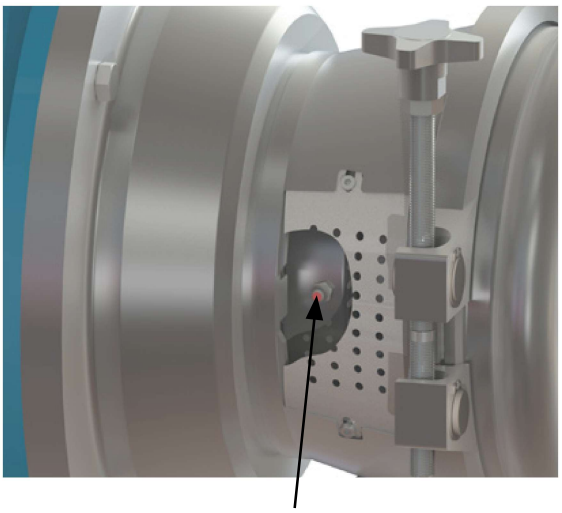
15.1 - BEARINGS MAINTENANCE FOR CR SERIES PUMPS

In CS series pumps up to motor size 132 (5.5 ÷ 9.2 kW) the bearings installed are shielded and consequently do not need to be lubricated.

15.2 - BEARINGS MAINTENANCE FOR CR PUMPS WITH HOUSING SIZE 160

The bearings of CR pumps are sized for an operational life of 20,000 hours or more.
The life of the bearing and feasible re-lubrication interval may be reduced in the following cases: harsh working conditions (high ambient temperature and humidity, dust, aggressive atmosphere), use with frequent starting and stopping cycles and/or at variable loads and extended periods of inactivity.
Maintenance intervals are therefore to be established according to the conditions of use and based on acquired experience.

(Fig. 1)



Grease nipple (only for motors gr. 160)

In CR series pumps with housing size 160 (11 ÷ 15 kW), the bearings must be lubricated periodically; to ensure correct lubrication, the bearing must be disassembled, cleaned thoroughly and lubricated with fresh grease, making sure only to fill the crowns to half their volume. They can be topped-up with grease periodically via the grease nipple on the bearing housing (see pict. 1). Each time the bearing is disassembled, replace the grease lip sealing gasket (pos.32), making sure the ring sealing seat is not worn.

To lubricate the bearings correctly, you are recommended to use high performance grease of SKF LGHP2 with temperature range -30°C/150°C.

The following table provides indications on the re-lubrication interval on the amount of grease recommended and the type of bearing on the pump.

Pump CR 100-125 / Detail		Lubrication interval (service hours)	Q.ty grease (grams)
Motor bearing IEC 160	3214 A C3	8000 ÷ 5000	20

16.0 - CLEANING PROCEDURE


Use suitable personal protective equipment during cleaning operations.

16.1 - EXTERNAL CLEANING

Periodically clean the external parts of the pump and motor to prevent dust and deposits building up which could reduce heat dissipation and/or damage the external surfaces.

16.2 - CLEANING OF INTERNAL PARTS

Before performing any maintenance work which requires disassembly of the pumping parts, carry out internal cleaning by running the pump with washing fluids compatible with the pumped fluid and the pump materials.
If the pump needs to be sent back to C.S.F. Inox for maintenance/repair work, fill in the Declaration of Decontamination (page 29).

16.3 - CLEANING OF FOOD-CONTACT PUMPS


When a pump is intended to handle food products, it must be perfectly clean before it is put into operation.

This can be achieved by performing a CIP (cleaning in place) washing procedure or by disassembling the pumping part for manual cleaning.

It is up to the user to choose the most suitable cleaning method based on the type of product being handled and the processing stage in which the pump is used.

In the case of CIP, the user is responsible for selecting the necessary detergents, operating temperatures and detergent product concentrations based on the type of food product being pumped.

The duration of each step in the CIP washing cycle depends on the type of dirt/residue that needs removing.

It is important to check the compatibility of the chemical products and operating temperatures used in the washing cycle with the pump components specified in the data sheet (elastomers, mechanical seal).
The cleaning process must also be carried out in the following situations:

- Before a long period of non-use
- Before any disassembly operations for maintenance work and after subsequent reassembly if worn parts have been replaced
- Before restarting after a long period of non-use.
- At intervals established by the user based on the characteristics of the pumped products and the type of process in which the pump is used, in order to guarantee food product hygiene.

It is the user's responsibility to verify the effectiveness of the cleaning procedure adopted.

Alkaline detergents:

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).

16.4 - CIP WASHING PROCEDURE

A typical example of a CIP washing procedure is described below:

a) Prerinse with cold water (15-25°C) for 10-15 minutes to remove any residue.
b) Warm prerinse with water at 45-60°C for 10 minutes.
c) Rinse with alkaline solution at 70-80°C for 20-30 minutes.
d) Intermediate rinse with water (warm or cold) up to 60°C for 5-10 minutes.
e) Rinse with acid solution like nitric acid for 10 – 15 minutes at ambient temperature.
f) Final rinse with cold water for 10-15 minutes or until any traces of cleaning agent have been removed.

Warnings:

a) During the CIP process there are thermal expansion: take care that there are not rapid temperature variations.
b) Chemical agents at high temperature can cause potential health risk: respect the safety regulation and use protection devices.
c) Control the concentrations and temperature of chemical agents during the CIP.
d) 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

Elastomers / temperature limits	Steam/hot water	Chemical bactericidal
EPDM	121°C	82°C
FPM/FKM	149°C	82°C

Impeller cap 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 cap nut using steam at 143°C for 30 minutes in an autoclave or using chemicals (for example glutaraldehyde-based solutions). Do not use chlorine solutions because stainless steel could be damaged by corrosion.

DECLARATION OF DECONTAMINATION

In observance of the legal provisions in force and to protect the health and safety of our personnel, you must fill in, sign and return this declaration to us before we can processyour order. Please make sure that the same declaration is attached to the outside of the packaging.

Shipping address: **C.S.F INOX S.p.a.** Strada per Bibbiano, 7 42027 Montecchio E. (RE), Italy	**For information contact:**

***Mandatory fields**

* Pump: _____ *Serial Number: _____
Commissioning date: _____
* Field of application: _____
Fluid handled: _____

Process data: Temperature: _____ [°C] Pressure: _____ [bar]

Flow rate:_____ [m^3/h] Viscosity:_____ [mm^2/s]

*** Product and warnings:**

	Product/ concentration	Flammable	Toxic	Corrosive	Hazardous/ irritant	Other**	Harmless
Processing product		☐	☐	☐	☐	☐	☐
Cleaning product		☐	☐	☐	☐	☐	☐
Parts cleaned by		☐	☐	☐	☐	☐	☐

**** Explosive; oxidant; harmful for the environment; biological risk; radioactive.**
Please mark the appropriate warning, include the material safety data sheet and, if necessary, any further specific warnings.

*** Reason for returningitem/s:**

_____
_____

* ☐ Particular safety precautions for further handling are not required
* ☐ The following precautions are required in the case of cleaning liquids, fluid residues and disposal:

_____
_____

Company details:
Company: _____ Phone no.: _____
Contact: _____ Fax: _____
Address: _____ Email: _____
Your order number:_____

‘ We hereby certify that this form has been filled in to the best of our knowledge and in accordance with the legal provisions in force. Furthermore, we certify that the parts have been carefully cleaned and to the best of our knowledge are free from residues in quantities which could be deemed harmful. ’

Place, date ……

Name, department ……..

Signature

……

17.0 - WASTE DISPOSAL AND DECOMMISSIONING

The pump, complete with electrical drive system, is a plant component which must be disposed of in accordance with regulations governing the disposal of waste derived from professional electrical and electronic equipment.

Neither the pump nor any of its parts may be disposed of with household waste.

17.1 - PACKAGING MATERIALS

The packaging material consists of wooden or cardboard boxes, polyethylene shrink-wrap covers and polyurethane foam, galvanized steel screws, polyester belts.
Wooden or cardboard boxes and screws can be recycled or sent to authorized waste disposal facilities.
The remaining packaging materials must be sent to authorized waste disposal facilities.

17.2 - WASTE RESULTING FROM MAINTENANCE OPERATIONS

All materials replaced during maintenance operations must be disposed of in compliance with current regulations and sent to an authorized waste disposal facility.
Consult the pump's bill of materials, supplied with this manual, to identify the materials used to make the replacing components.
All replaced metal parts must be sent to metal recycling centres; plastic or elastomeric parts and spent lubricants must be disposed of at authorized waste disposal facilities.

17.3 - DISPOSAL OF THE PUMP

For disposing the pump please observe the following instructions:
- disconnect electrical and hydraulic connections according to technical rules and laws in force.
Disassemble all components of the pump for separate dismantling; wash the components and clean the structure accurately.

The main components of the pump are made from the following materials:

- Pump casing, cover, impeller, shaft, impeller nut: AISI 316L stainless steel (for special alloy pumps, see the bill of materials)
- Elastomers/Polymers NBR-EPDM-FKM-FFKM-PTFE
- Support and external parts: AISI 304
- Other components: composite mechanical seals, stainless steel and elastomers, ball and roller bearings.
- Motor: Aluminium - Cast Iron - Copper (consult the manual supplied by the manufacturer)
- Spend oils and greases

For further details, consult the pump's bill of materials, supplied with this manual, to identify the materials used to make the various components.

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

The components of the pump should be properly got rid, according to the corresponding rules in force in receiver’s country.

DECLARATION OF CONFORMITY

The company: **C.S.F. Inox S.p.A.**

based in: **Strada per Bibbiano, 7**
Montecchio Emilia (R.E.)
ITALIA

hereby declares, under its sole responsibility that the pump:

CENTRIFUGAL PUMP

Type XXX

Serial no. XXX Year XXX

CE Declaration of Conformity (Ann. II.A, 2006/42/EC)

to which this declaration refers, is in conformity with safety requirements according to Directive 2006/42/EC.

Name and address of the person authorized to compile the technical file:
C.S.F. Inox S.p.A. Strada per Bibbiano 7 - 42027
Montecchio Emilia (RE) ITALY

Applied Regulations:

EN 12100 2010
EN 809 2009

Food products-contact suitability declaration

is made with materials suitable to come in contact with food according to the regulation (EC) no. 1935/2004.

2014/35/EU : electrical material intended for use within certain voltage limits.

Montecchio Emilia, XXX

The Chairman Mr. Rolando Paterlini

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