TECHNICAL SERVICE
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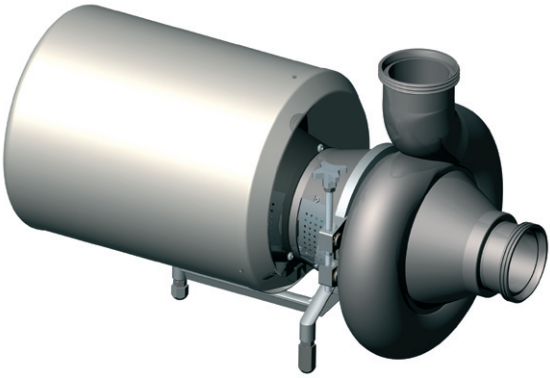
CENTRIFUGAL PUMPS
CR series



**INSTRUCTIONS FOR INSTALLATION,
OPERATION AND MAINTENANCE**

CSF inox

"Translation of the original instructions"

INDEX

Version: 05 Date: 01/08/14

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.

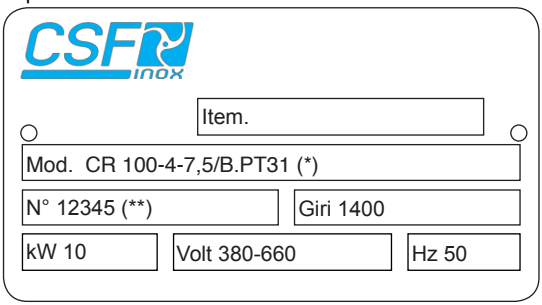


Plate example

1 SYMBOLS

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

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.
- 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.

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 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.

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 transfering 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. 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 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 By goods receiving, the wholeness of packing must be verified, in order to identify possible damages to the content occured during transfering 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.

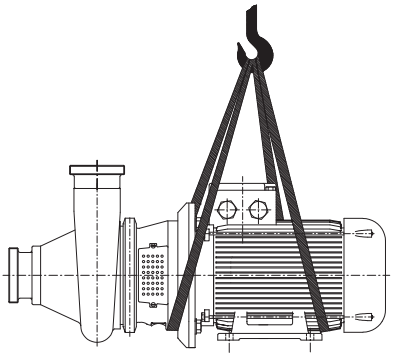
4.3 TRANSFERRING

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 CR series are single-stage centrifugal pumps with axial suction port and a specially designed screw impeller.
Manufactured in AISI 304 - AISI 316 stainless steel with food standard finishes.
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. The CR pumps are suitable for food and beverage operations for pumping fluids with solids without maceration of the product.

5.1 SOUND PRESSURE LEVEL

The sound pressure level of centrifugal pumps is the following: 85 dB(A) MAX.
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

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)

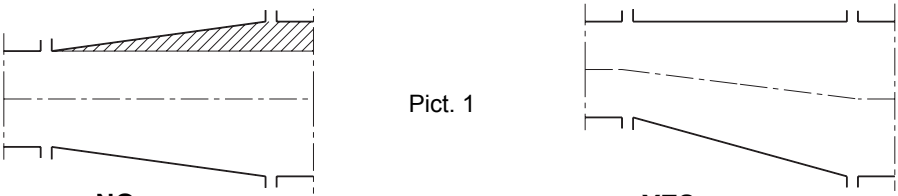
The centrifugal pumps can operate correctly only if vapour has not formed inside. For this reason the static head at the reference point for the NPSH is the centre of the impeller, that is the point of intersection of the pump shaft axis with the vertical plane that passes through the external points 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.

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



Pict. 1

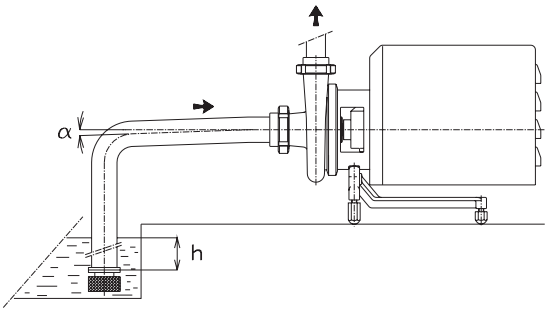
The suction pipe must be as short as possible and rise as it moves towards the pump if it is sucking from a tank (Pict.2). If on the other hand the pump is below the level of the liquid, the pipe should descend slightly (Pict.3). If the pump is used for transporting hot liquids, fit expansion joints 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. 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

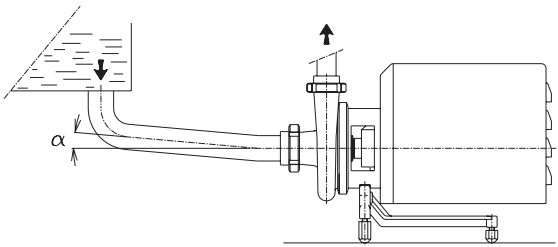
V = m/s

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.



Pict. 2

Pict. 3



- 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.

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 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; 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 substain this increase in absorption, use a star-delta starter or other kind of device (e.g. an autotransformer).

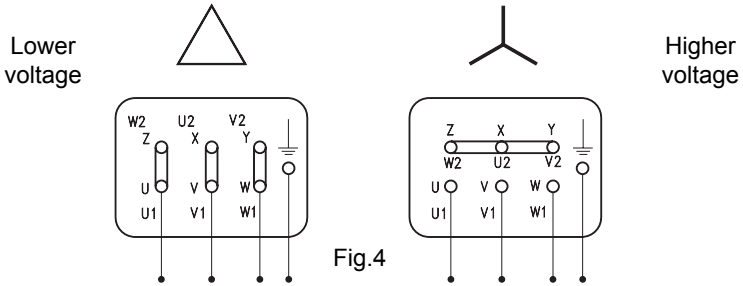


Fig.4

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.

8 OPERATION

8.1 PRELIMINARY OPERATIONS

- Check that the pump turns freely under hand pressure.
- Check that the pump turns in the marked direction (CLOCKWISE, as seen from the control 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.

8.2 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.

8.3 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.
- 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.

8.4 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.

8.5 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.

9 SPARE PARTS

RECOMMENDED SPARE PARTS FOR TWO YEARS OF OPERATION ACCORDING TO THE NUMBER OF PUMPS INSTALLED - VDMA STANDARDS					
Denomination	**NUMBER OF PUMPS** (including reserve)				
	1	**2**	**3**	**4**	**5**
MECHANICAL SEAL	1	2	3	4	4
PUMP COVER O-RING SEAL	2	3	5	6	7
BEARING	1	2	3	4	4
GACO RING (for motor powers over kW 11)	1	2	3	4	4

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

10 SEALS

All C.S.F. centrifugal 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.
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.

11 MAINTENANCE

SEE ENCLOSURE FOR MAINTENANCE OF SEAL AND PUMP.

12 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 S.S. Aisi 304 - Aisi 316
- elastomers NBR - EPDM - FLUOROCARBON (FPM) - TEFLON
- motor Aluminium - Cast iron - Copper

Components made from amianthus or lead are not used in our production.

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

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