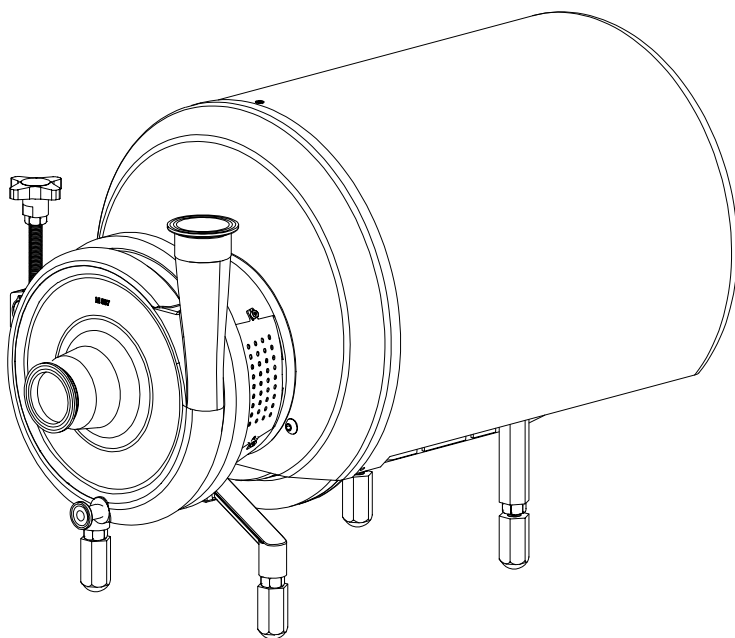


CENTRIFUGAL PUMPS

CS Series



**INSTRUCTIONS FOR INSTALLATION,
OPERATION AND MAINTENANCE**

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FOREWORD

Read the instructions carefully and keep them for future consultation.

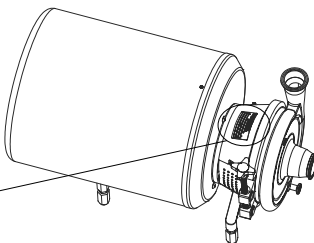
C.S.F. Inox S.p.A. reserves the right to make any changes to the documentation it deems necessary without being obliged to update publications that have already been issued.

When requesting information, spare parts or assistance, always specify the pump type (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.

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

		POMPE-RACCORDERIA			
		Montecarlo E. - ITALY		Tel.0522-869911 http://www.csf.it	
Item. (1)					
Type (2)					
N° Motr. (3)	Anno (4)	(5)	r.p.m		
kW (6)	Volt (7)	Hz (8)			



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

When the pump is working the following occurs:

- Mechanical parts are moving
- Pump casing, pipelines and articulations are under internal pressure. Therefore do not remove any safeguard or locking, do not loosen screws or clamps, as this can cause serious damage to persons or objects.
- Electric parts are in tension
- Non-observance of inspection and maintenance operations 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 operations involving disassembly of the pump (inspection, cleaning, seal replacement, etc.), the following preliminary operations must be carried out:
 - switch off engine tension and disinsert electric connection
 - Close the valves on the suction and outlet pipelines, in order to avoid the risk of flooding;
 - 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.

3.0 - 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.

The guarantee does not cover wear parts or repairs for damage caused by improper use, abrasion, corrosion, negligence, defective installation, non-observance of inspection and maintenance operations, use of non-genuine spare parts, accidents or any work carried out by the purchaser designed to alter the machine's performance as indicated by 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. Returned items must be properly packed in order to avoid damages during transport and a technical report describing the defect and how it manifested itself 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 46), 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 - TRANSPORT

The packings of all pumps manufactured by C.S.F. Inox S.p.A. are defined when placing the order. Unless prior arrangements are made, 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 - DELIVERY



On delivery of the supply it is essential to make sure that the packaging has not been damaged during transport so that any claims can be made immediately to the carrier.

Should any damage be ascertained, the following procedure must be observed:

Accept the goods with reserve

Take photographic evidence of the damage

Notify the carrier of the damage sustained via registered mail with the photographic evidence attached.

4.3 - 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



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.

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 & safety regulations in force locally.

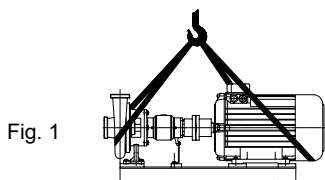


Fig. 1

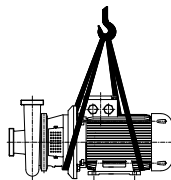


Fig. 2

5.0 - RETURNS

- 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 47).

6.0 - DESCRIPTION

The CS series comprises single-stage centrifugal pumps with axial suction port, open centrifugal impeller and trapezoidal volute casing. 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 compliant with the legislation in force and IP 55 protection rating, unless otherwise specified.

They are designed exclusively for professional use.

6.1 - TECHNICAL DATA

- Maximum operating pressure: 10 bar up to 100°C
 - Temperature range: -20°C to 100°C (on request, up to 140°C for water and up to 190°C for edible oil).
- The operating temperature range is determined by the type of mechanical seal and the material of the elastomers used.

If 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 centrifugal pumps is the following (see table):

		PUMP TYPE					
Noise index dB(A)	< 70	CS 25-145	4-pole	CS 25-175	4-pole	CS 32-110	4-pole
		CS 32-145	4-pole	CS 32-175	4-pole	CS 32-210	4-pole
		CS 32-260	4-pole	CS 40-145	4-pole	CS 40-175	4-pole
		CS 40-210	4-pole	CS 40-260	4-pole	CS 50-145	4-pole
		CS 50-175	4-pole	CS 50-210	4-pole	CS 50-260	4-pole
		CS 65-145	4-pole	CS 65-175	4-pole	CS 65-210	4-pole
	71 ÷ 75	CS 25-145	2-pole	CS 25-175	2-pole	CS 32-110	2-pole
		CS 32-145	2-pole	CS 32-175	2-pole	CS 65-260	4-pole
		CS 80-175	4-pole	CS 80-210	4-pole	CS 80-260	4-pole
	76 ÷ 80	CS 32-210	2-pole	CS 40-145	2-pole	CS 40-175	2-pole
		CS 40-210	2-pole	CS 50-145	2-pole	CS 50-175	2-pole
		CS 50-210	2-pole				
	81 ÷ 85	CS 32-260	2-pole	CS 65-145	2-pole	CS 100-260	4-pole
		CS 40-260	2-pole	CS 65-175	2-pole	CS 125-260	4-pole
		CS 50-260	2-pole	CS 80-310	4-pole	CS 100-310	4-pole
		CS 80-175	2-pole				
	86 ÷ 90	CS 65-210	2-pole	CS 65-260	2-pole	CS 80-210	2-pole
		CS 80-260	2-pole	CS 100-210	2-pole	CS 100-260	2-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).

6.3 - WEIGHTS

The weight may vary depending on the execution (see types on page 13), the make and/or model of the motor installed.

For the weight of the pump, please refer to the data sheet accompanying the instructions.

7.0 - NON-PERMITTED USES

Do NOT use the pump in the following cases:

- With a suction pressure greater than the specified value (0.5 times the discharge head generated by the pump).
- Without guards and/or with disabled, faulty or missing safety devices.
- If it has not been installed correctly.
- If there are power supply faults.
- In the event of serious maintenance shortcomings.
- Following unauthorized modifications.
- For improper use of the machine.
- Without following the instructions provided.

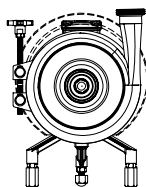
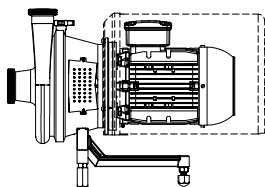
The pump must always be used in an environment appropriate to the level of protection of the motor. Always check this on the motor plate before installation.



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

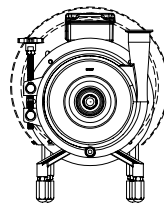
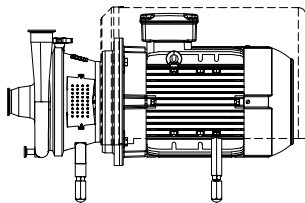
Components complying with the safety standards for the environment in question must be used.

TABLE OF WEIGHTS FOR CS PUMPS - MOTORS FROM 0.37 KW TO 4 KW (IEC 71-112 FRAME SIZE)



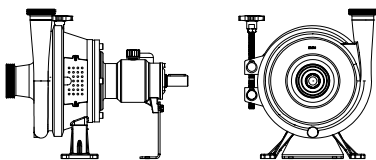
Pump type	1450 revs/min	kW	Weight kg	Pump type	1450 revs/min	kW	Weight kg	Pump type	2900 revs/min	kW	Weight kg
CS 25-145		0.37	27	CS 50-175		0.55	42	CS 25-145		0.55	26
		0.55	32			0.75	44			0.75	32
		0.75	37			1.1	46			1.1	34
CS 25-175		0.37	30			1.5	50			1.5	40
		0.55	34			2.2	73			2.2	43
		0.75	42			3	69			0.75	35
CS 32-110		0.37	24	CS 50-210		4	72	CS 25-175		1.1	37
		0.55	28			1.1	49			1.5	42
		0.75	33			1.5	52			2.2	45
CS 32-145		0.55	35			2.2	77			3	60
		0.75	40			3	73			4	69
		0.55	37			4	76			0.55	23
CS 32-175		0.75	42	CS 50-260		2.2	86	CS 32-110		0.75	29
		1.1	46			3	82			1.1	31
		0.75	44			4	86			1.5	36
CS 32-210		1.1	50	CS 65-145		1.1	48	CS 32-145		0.75	36
		1.5	50			1.5	51			1.1	37
		2.2	74			1.1	50			1.5	43
CS 32-260		3	70	CS 65-175		1.5	53			2.2	46
	1.1	58	2.2		76	3	56				
	1.5	61	3		72	4	65				
CS 40-145	2.2	84	CS 65-210		4	76	CS 32-175	1.5	45		
	3	80		1.5	60	2.2		48			
	4	84		2.2	81	3		56			
CS 40-175	0.55	36	CS 65-260	3	77	CS 32-210	4	67			
	0.75	41		4	81		3	62			
	0.75	43		3	86		4	69			
CS 40-210	1.1	46		CS 80-175	4	90	CS 40-145	1.5	42		
	1.5	49	2.2		82	2.2		45			
	0.75	47	3		78	3		57			
CS 40-260	1.1	51	CS 80-210		4	82	CS 40-175	4	66		
	1.5	54		2.2	85	2.2		49			
	2.2	76		3	81	3		60			
CS 50-145	1.5	62		CS 80-260	4	85	CS 50-175	4	66		
	2.2	84	4		93	3		61			
		3						4	73		
	4						1.5	45			
	0.75	43					2.2	48			
	1.1	45					3	59			
	1.5	48					4	68			
							3	61			
							4	70			
							3	61			
							4	70			

TABLE OF WEIGHTS FOR CS PUMPS - MOTORS FROM 5.5 KW TO 22 KW (IEC 132-180 FRAME SIZE)



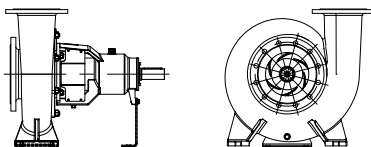
Pump type	1450 revs/min	kW	Weight kg	Pump type	1450 revs/min	kW	Weight kg	Pump type	2900 revs/min	kW	Weight kg	
CS 65-260		5.5	117	CS 32-210		5.5	98	CS 50-210		5.5	107	
		7.5	126			7.5	104			7.5	113	
		9.2	135			9.2	110			9.2	120	
		11	195			11	157			11	163	
CS 80-175		5.5	110	CS 32-260		5.5	107			15	170	
		7.5	118			7.5	113			18.5	179	
CS 80-210		5.5	113			9.2	120			22	221	
		7.5	122			11	176			15	188	
CS 80-260		5.5	119			CS 40-175	15	184		CS 50-260	18.5	196
		7.5	128				5.5	96			22	233
		9.2	137	7.5			102	CS 65-145		5.5	98	
		11	195	9.2			110			7.5	104	
CS 80-310		15	202	CS 40-210		11	153			9.2	111	
		11	205			5.5	100			11	157	
		15	212			7.5	107	5.5		100		
		18.5	255			9.2	114	7.5		106		
CS 100-210		22	266	CS 40-260		11	160	CS 65-175		9.2	113	
		5.5	116			15	165			11	160	
CS 100-260		7.5	125			7.5	114			CS 65-210	15	167
		9.2	148			9.2	121				18.5	176
		11	204			11	176	22			218	
		15	211			15	185	11			173	
CS 100-310		18.5	252	CS 50-145		18.5	194	CS 65-260		15	181	
		11	209			22	237			18.5	191	
		15	216			5.5	95			22	229	
		18.5	258			7.5	101			15	190	
CS 125-260	22	270	CS 50-175	5.5	97	CS 80-175	18.5	200				
	9.2	160		7.5	103		22	237				
	11	215		9.2	110		11	173				
	15	222		11	157		15	180				
18.5	264	15		164	18.5	190						
								CS 80-210	22	227		
									15	186		
									18.5	195		
									22	232		
								CS 100-210	22	238		

TABLE OF WEIGHTS FOR CSK EXECUTION PUMP (2ND-3RD GROUP)



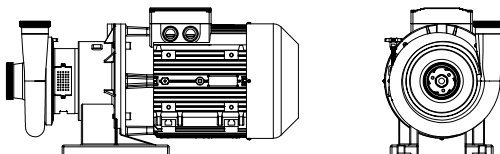
Pump type	2nd Group	Weight kg	Pump type	3rd Group	Weight kg
CSK 32-145		21	CSK 65-210		52
CSK 32-175		23	CSK 65-260		62
CSK 32-210		25	CSK 80-175		46
CSK 40-145		22	CSK 80-210		54
CSK 40-175		24	CSK 80-260		64
CSK 40-210		26	CSK 100-210		57
CSK 50-145		27	CSK 100-260		72
CSK 50-175		23	CSK 100-310		80
CSK 50-210		27	CSK 125-260		86
CSK 65-175		29			

TABLE OF WEIGHTS FOR CSK EXECUTION PUMP (4TH GROUP)



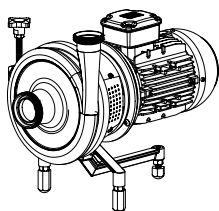
Pump type	4° Gr.	Weight kg
CSK 125-350		157
CSK 150-350		194

TABLE OF WEIGHTS FOR CSK EXECUTION PUMP - MOTORS FROM 30 - 37KW (IEC200 FRAME SIZE)

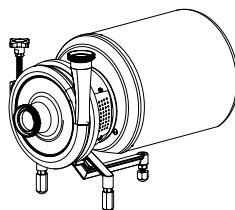


Pump type	rpm	kW	Weight kg
CSX 50-260	2-pole	30-37	322
CSX 65-260		30-37	326
CSX 80-175		30-37	323
CSX 80-210		30-37	328
CSX 80-260		30-37	336
CSX 80-310		30-37	386
CSX 100-210		30-37	331
CSX 100-260		30-37	341
CSX 100-310		30-37	392
CSX 125-260		30-37	404

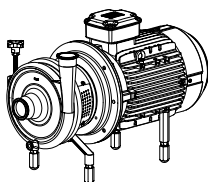
8.0 - EXECUTIONS



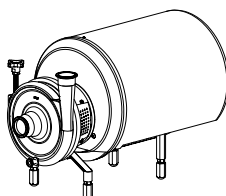
CS - shroudless execution with adjustable support feet from 0.37kW to 4 kW



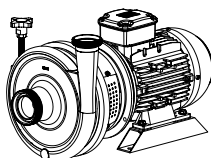
CS - shrouded execution with adjustable support feet from 0.37 kW to 4 kW



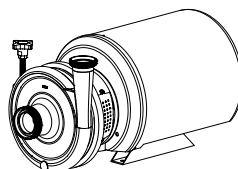
CS - shroudless execution with adjustable support feet from 5.5 kW to 22 kW



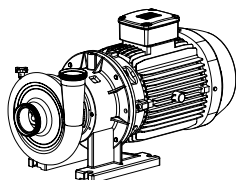
CS - shrouded execution with adjustable support feet from 5.5 kW to 22 kW



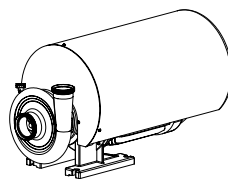
CS - shroudless execution with fixed support feet from 0.37 kW to 22 kW



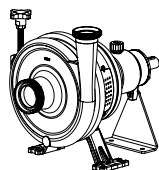
CS - shrouded execution with fixed support feet from 5.5 kW to 22 kW



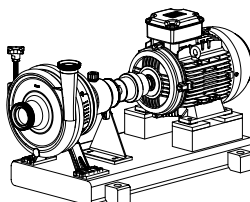
CSX - shroudless execution 30 kW



CSX - shrouded execution 30 kW



CSK - bare shaft execution



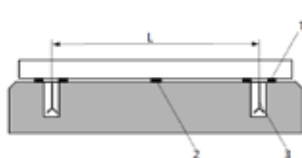
CSK - execution with joint and base

9.0 - CSK SERIES INSTALLATION

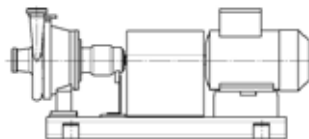
9.1 - INSTALLATION ON FOUNDATION PLINTH

The foundation plinth must be of the required structure and solidity. It must be prepared based on the dimensions provided in the dimensions sheet/installation diagram.

Proceed as follows:



1	Thickness
2	Thickness with (L) > 800 mm
3	Foundation bolt
L	Distance between foundation bolts



1. The pump unit must be positioned on the foundation plinth and aligned with the help of a spirit level positioned on the shaft and discharge port. Maximum permitted tolerance: 0.2 mm/m.
2. If necessary insert levelling shims (1) always on both the left and right near the foundation bolts (3) between the base plate/frame.
If the distance of the foundation bolts is (L) > 800 mm, insert further shims (2) at the centre of the base plate. All shims must be perfectly flat.
3. Insert the foundation bolts (3) in the relative holes.
4. The foundation bolts (3) must be then grouted into the foundation plinth.
5. After the grouting has set, align the base plate.
6. Uniformly tighten the foundation bolts (3) all the way home.
7. Grout in the base using controlled shrinkage cement with a water/cement ratio of ≤ 0.5 .
Perform post-treatment of the concrete in compliance with standard EN 206.



8. The pump-motor set is aligned on the base at the C.S.F. plant before it is shipped. After performing installation, securing the unit to the foundation and connecting the suction and delivery piping, recheck alignment.

9. Before starting the unit the joint guard must be installed, after which this can only be removed by qualified personnel for the purpose of carrying out inspections and/or maintenance work and only after the unit has been stopped and disconnected from the electrical power supply.



Misalignments cause strain and vibrations on the drive which in turn will lead to untimely wear and breakage of the joint and bearings.

9.2 - INSTRUCTIONS ON ASSEMBLING CSK COUPLINGS

TYPE "A" ELASTIC COUPLINGS

1. Assembling the hubs

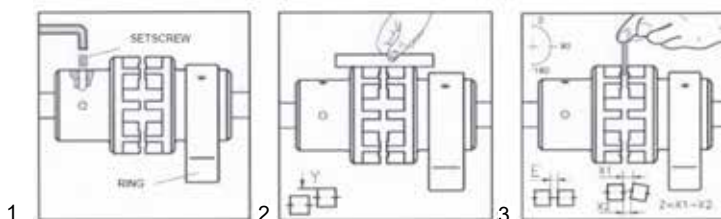
When installing the hubs on the shafts, do not forget the sealing ring installed on the two hubs. Check the grub screws on the hubs are fastened and tightened correctly. If the coupling is used in an ATEX area, secure the grub screw between hub and shaft further, for example using Loctite (medium strength) or similar.

2. Radial alignment

The radial alignment is controlled with a rule or a dial indicator or laser. By resting the rule on the periphery of the hubs and matching up two opposite teeth, you will have a sufficiently broad line of contact to check they match up throughout their surface area. Better alignment precision is obtained with the help of a dial indicator or laser (keep to radial tolerance Y).

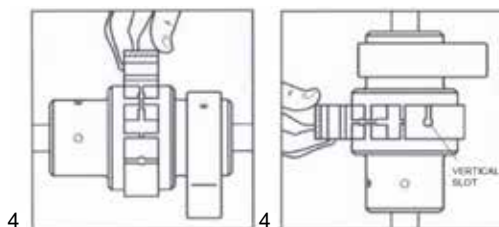
3. Axial and angular alignment

Position the hubs at distance E, as for Table 1. Using the thickness feelers, you can control the gap between hubs, measurement E (keep to axial tolerance X). It is advisable to check the values of measurement E in three positions (0-90-180 degrees), as this will ensure more precise angular alignment (keep to angular alignment Z).



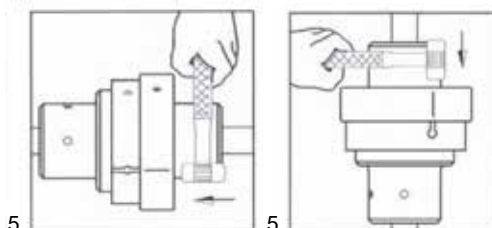
4. Assembling the elastic insert

Once the two hubs have been aligned, proceed to assemble the elastic insert in the slots formed by the parallel teeth. If the radial and angular alignment is correct, the ends of the elastic insert, once closed, should match up in their development and width. The elastic insert has two types of housing: a through housing, with dual inlets, for horizontal work, and a single-inlet housing for vertical work.



5. Assembling the ring

Once the elastic insert has been fitted, the retention ring can be inserted manually, by matching up one of the two reference lines on the outside of the ring with the insertion grooves on the elastic insert. Using a nylon mallet, install the retention ring, tapping delicately and alternately on each side of the two areas corresponding to the reference marks on the ring.

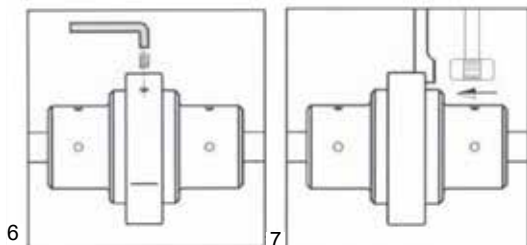


6. Securing the ring

Once the ring has been installed on the elastic insert, it needs to be fastened by inserting the two set screws (Tab. 2) into the threaded housings, which match up with those for the elastic insert. We recommend securing the tightness of the set screws by applying Loctite (medium strength) to the screw-threading. Any potential axial displacement of the ring, due to misalignment of the equipment, is thereby secured.

7. Disassembly

Remove the two set screws from the ring. Shift the ring by tapping it on the side with a nylon hammer in the areas the pins (reference lines) are housed.



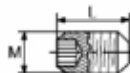
PERMITTED SALIGNMENT TOLERANCES

Tab. 1

Type	A00	A0	A1	A2	A3	A4	A45	A5	A55	A6	A7	A8	A9	A10	A11
E	1.5	1.5	1.5	2.5	2.5	3.5	3.5	3.5	3.5	3.5	4	5	5	6	6
Axial X	+0.3	+0.3	+0.5	+0.5	+0.7	+0.8	+1.0	+1.0	+1.0	+1.0	+1.0	+1.5	+1.5	+1.5	+1.5
Radial Y	0.2	0.3	0.3	0.5	0.5	0.7	0.7	0.7	0.8	0.8	1.0	1.0	1.0	1.5	1.5
Angular Z	0.10	0.10	0.20	0.20	0.30	0.40	0.40	0.50	0.50	0.60	0.90	1.10	1.30	1.70	1.70

Tab. 2

Type	A00	A0	A1	A2	A3	A4	A45	A5	A55	A6
DIN 913	-	-	M5	M6	M8	M8	M10	M10	M10	M10
L	-	-	8	12	12	14	14	14	14	14



DIN 913

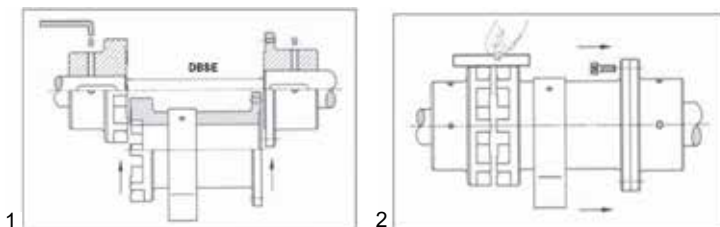
COUPLINGS WITH SPACER TYPE A...-SP

1. Assembling the hubs

Once the hubs have been fitted and secured with the setscrews, proceed to line them up, leaving gap DBSE (140 mm) to insert the spacer body. Do not forget to fit the attachment ring first.

2. Alignment and assembly

Once the spacer body has been attached to the flange hub, and the screws secured with their tightening torque (table 4), position the hub and the spacer body at distance E, as for table 3 (keeping to axial tolerance X).



3. Next, proceed in the same way as for assembly of coupling A.

PERMITTED SALIGNMENT TOLERANCES

Tab. 3

Dimension (E) and tolerance in mm.										
Type	A1C	A2C	A3C	A4C	A45C	A5C	A55C	A6C	A7C	A8C
E	3.0	3.0	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0
Axial X	+0.5	+0.5	+0.7	+0.8	+1.0	+1.0	+1.0	+1.0	+1.0	+1.5
Radial Y	0.1	0.1	0.15	0.20	0.20	0.20	0.20	0.20	0.30	0.30
Angular Z	0.20	0.20	0.30	0.40	0.40	0.50	0.50	0.60	0.90	1.1

Tab. 4

Grub screws-flange tightening torque										
Type	A1	A2	A3	A4	A45	A5	A55	A6	A7	A8
DIN 912	M6	M6	M8	M8	M10	M10	M10	M10	M12	M14
TQ (Nm.)	14	14	35	35	69	69	69	69	120	205

10.0 - INSTALLATION

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

NPSH of system (available 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.

10.2 - 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).



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 (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.

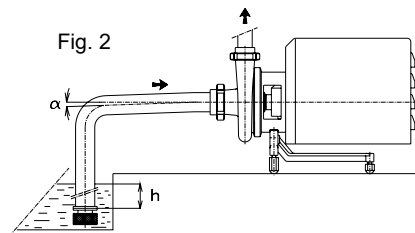


Fig. 2

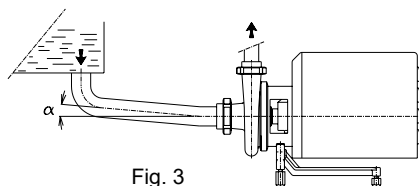


Fig. 3

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).

$$h_{min.} = \frac{V a^2}{2g} + 0,1 \quad \begin{matrix} h_{min} = m \\ V = m/s \end{matrix}$$

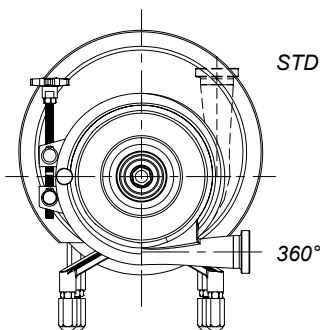
In order to prevent the formation of vortices when it is not possible to observe the values of minimum available head, it is possible to fit crosses in the piping. This system is suitable even for tanks with a positive head.

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.

It is possible to install the CS pump in a self-draining position by rotating the casing to the 360° position, as shown in the figure. This configuration must be agreed upon with C.S.F. Inox S.p.A. at the time of ordering.



10.3 - ELECTRICAL CONNECTION



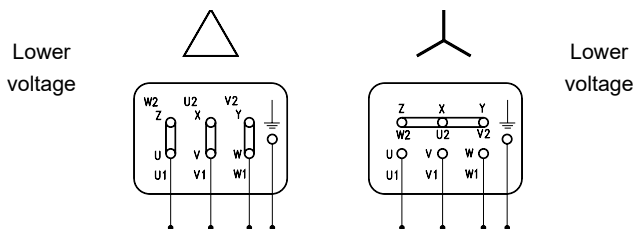
Make the electrical connection only after the hydraulic connection has been completed; set up the motor control system in conformity with the technical standards and regulations in force (EN 60204-1): in particular a manual electric power switch must be installed with adequate current switching capacity; 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 sustain this increase in absorption, use a star-delta starter or other kind of device (e.g. an autotransformer).

Pict.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 the technical standards and regulations in force.

11.0 - OPERATION

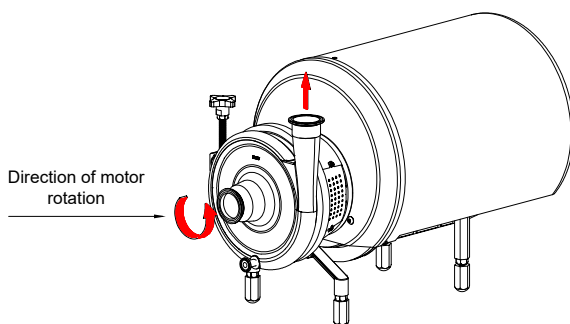
11.1 - PRELIMINARY OPERATIONS BEFORE START-UP

- 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 that the pump turns in the marked direction as described in the figure (counterclockwise 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 casing.
 - 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.

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.
- If the discharge head generated by the pump is greater than that required, the diameter of the impeller can be reduced. If, on the other hand, the head is lower than required, with equal flow rate, an impeller with a larger diameter can be installed (provided that the one installed isn't already the largest) and probably a more powerful motor is needed.

- 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.

11.2 - 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.

11.3 - 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 19 on page 45.

12.0 - SPARE PARTS

12.1 - REFERENCE TABLE OF MAIN PARTS SUBJECT TO REPLACEMENT

Pump type CS-CSX		32-110	25-145	25-175	32 40 50 65	32 40 50 65	32 40 50	80	65 80 100	32 40 50 65 80 100 125	80 100	125 150
					-145	-175	-210		-175	-210		
Detail												
* Mechanical seal EN12756-ISO3069		D.20			D.28			D.43				D.55
Casing O-ring		OR 6412	OR 215	OR 6670	OR 215	OR 6670	OR 6795	OR 6670	OR 6795	OR 6995	OR 61150	OR 81300
Impeller cap nut O-ring		OR 2087			OR 2112			OR 2150				OR 3206
Bearing	IEC 71	3205			---			---				---
	IEC 80	3207 A 2RS-C3			3208 A 2RS-C3			3208 A 2RS-C3				
	IEC 90											
	IEC 100	3208 A 2RS-C3			3208 A 2RS-C3			3208 A 2RS-C3				
	IEC 112											
	IEC 132	---			3210 A 2RS-C3			3210 A 2RS-C3				
	IEC 160	---			3212 A C3			3214 A C3				
	IEC 180	---			22214 E			22214 E				
IEC 200 (CSX)	---			---			C 2216.C3					
	---			---			6216 A.C3					
"Gaco" seal ring	IEC 160	---			AS 70x90x10			AS 80x100x10				
	IEC 180	---			AS 80x100x10			AS 80x100x10				
V-ring seal	IEC 200 (CSX)	---			---			V-Ring seal 90				
		---			---			V-Ring seal 75				

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

12.2 - RECOMMENDED SUPPLY

RECOMMENDED SPARE PARTS FOR TWO YEARS OF OPERATION FOR THE QUANTITY OF PUMPS INSTALLED IN ACCORDANCE WITH VDMA STANDARD					
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
IMPELLER CAP NUT O-RING SEAL	2	3	5	6	7
BEARING	1	2	3	4	5
GACO RING (for power ratings of 11 kW and over)	1	2	3	4	5

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

13.0 - OPERATING MALFUNCTIONS

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

Possible causes and necessary operations to solve them:

- 1) Pump not properly primed: repeat priming operations
- 2) Air entering from suction connections: check tightness
- 3) Air entering from the mechanical seal: replace the 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 piping: check for and remove all foreign matter from pipes and verify valve status (open if closed).
- 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 bottom valve (not flooded pumps): restore proper operation of the valve or replace it with one in good condition.
- 7) Plant friction losses higher than pump performance: reduce friction losses or replace the pump with a more suitable one for requested performances.
- 8) Incorrect direction of rotation or velocity too low (in the case of a pump operated by an inverter): restore correct direction of rotation or increase motor speed.
- 9) Impeller clogged by foreign matter (in the case of pump with closed impeller): remove all foreign matter.
- 10) Worn seals: replace worn parts.
- 11) Worn or partially clogged impeller: replace the impeller or remove foreign matter.
- 12) Product viscosity higher than specified: check pump size.
- 13) Too much gas in the fluid: install a deaerator.
- 14) Plant friction losses lower than foreseen: increase friction losses or set the pump at a higher working point.
- 15) Specific weight of the fluid higher than envisaged: increase the installed motor power.
- 16) Pumped fluid viscosity too high: check pump size.
- 17) Pump operating at a higher flow rate than envisaged due to plant friction losses lower than expected: set the pump at a lower working point or increase plant friction losses.
- 18) Rotation speed too high (when pump is controlled by an inverter): reduce speed.
- 19) Internal friction caused by rubbing between rotating and fixed parts: restore correct assembly conditions
- 20) Pump-motor misalignment or deformed shaft: restore correct alignment between pump and motor or replace shaft with a new one.
- 21) Damaged pump or motor bearings: replace the bearings.
- 22) Incorrect electrical hook-up: modify electrical hook-up observing the data provided on the motor data plate based on available voltage.
- 23) Incorrect voltage for motor installed: replace the motor with one which has a suitable voltage.
- 24) Excessive wear on the seal: change the mechanical seal.
- 25) Pumped fluid and/or fluid temperature not suitable for the seal type or the materials from which it is made: verify the choice of seal.
- 26) Inadequate cleaning of pump handling liquids which tend to crystallize: do not allow the product to remain inside the pump for a long time.
- 27) Incorrect seal assembly: reassemble taking care to do it correctly.
- 28) Incorrect direction of rotation for non-reversible seals: restore correct direction of rotation.

- 29) Insufficient flushing for external flushed seals: increase the quantity of flushing fluid.
- 30) Dry operation of pump: to prevent further occurrences of dry operation, install protective devices (e.g. flow switch) to block pump operation when necessary.
- 31) Shaft oscillations due to excessive play in the assembly, worn bearings, etc.: restore correct assembly conditions replacing any worn parts.
- 32) Suspended solids in the fluid: verify the choice of seal.
- 33) Temperature too high or thermal shock: gradually increase the temperature of the fluid to avoid sudden massive temperature changes, avoid dry operation of the pump.
- 34) Unbalanced impeller: replace the impeller
- 35) Pump running with excessively low flow rate: set the pump at a higher working point.
- 36) Pump running with excessively high flow rate: set the pump at a lower working point.
- 37) Pump and/or piping not adequately anchored: check and adjust the anchorage of the relative parts.
- 38) Bearings not lubricated (when lubrication is foreseen): replace bearings and restore correct lubrication (lubricant must be topped up from time to time based on operating conditions).
- 39) Water infiltration due to worn radial shaft seal: replace worn parts.

		PROBLEM ENCOUNTERED									
		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										●

14.0 - SEALS

All CSF Inox CS series pumps are fitted with mechanical seals with standardized seats in compliance with standards EN12756 and ISO 3069. 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 - Chromium-nickel
stainless steel, AISI 304
X - Stainless steel Inox AISI 316L
M - Superduplex

METAL OXIDES

2 - Alumina ceramic

ELASTOMERS

6 - Nitrile (NBR)
7 - Ethylene propylene (EPDM) (FDA-3A-USPV)
Y6 - Special Fluorocarbon (FDA-3A-USP VI)
Y - Fluorocarbon (FPM)
B - Silicone
U - Kalrez

CARBONS

V - Normal carbon
Z - Special carbon

RESINS

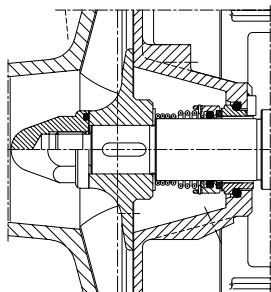
5 - Normal PTFE
4 - Loaded PTFE
F - O-RING FEP

METAL CARBONS

3 - Hard metal welded on stainless
steel (TUC)
R - Integral hard metal
hard metal (TUC)
K - Integral silicate carbon (SIC)
U - Integral silicate carbon WF1/PW

14.1 - SINGLE MECHANICAL SEALS

EXECUTION T / W



STANDARD MECHANICAL SEAL "T"

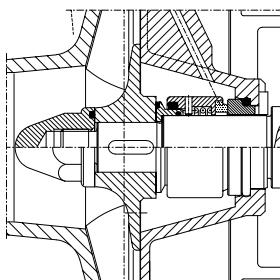
Standard execution foresees the assembly of an submerged internal mechanical seal on the product, housed behind the impeller in a specific tapered chamber so as to guarantee correct lubrication conditions.

MECHANICAL SEAL WITH CIRCULATION "W"

Internal mechanical seal with circulation forced by the pumped liquid.



EXECUTION TH-WH



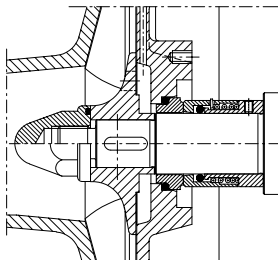
INTERNAL MECHANICAL SEAL "TH-WH"

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

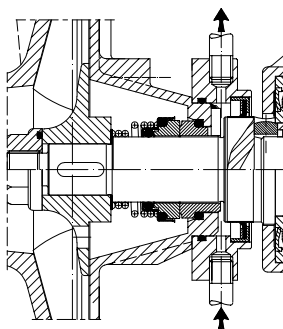


EXTERNAL MECHANICAL SEAL “Y”

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.



EXECUTION V



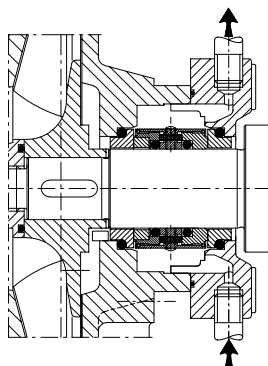
INTERNAL MECHANICAL SEAL “V”

The external liquid circulation chamber creates a protective barrier in the presence of aggressive or toxic liquids. The function of the flushing is to clean the seal surfaces in order to limit the wear.



14.2 - DOUBLE MECHANICAL SEALS - CS / CSX

EXECUTION Q



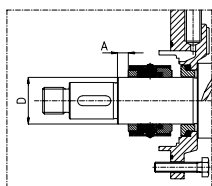
COMPACT DOUBLE MECHANICAL SEAL “Q”

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.



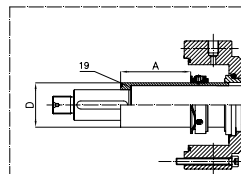
D (mm)	AT (mm)
20	11
28	8
43	20.5

Tab. 1



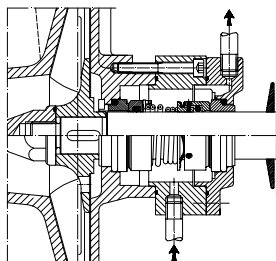
D (mm)	AT (mm)
55	86.5

Tab. 2



14.3 - DOUBLE MECHANICAL SEALS - CSK

EXECUTION Q



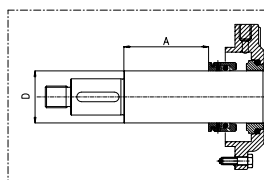
DOUBLE MECHANICAL SEAL "Q"

Double mechanical seal (back-to-back) with liquid circulation. 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.



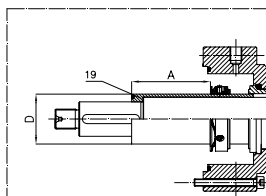
Tab. 3

D (mm)	AT (mm)
28	42
43	70



Tab. 4

D (mm)	AT (mm)
55	86.5



"Q" and "V" 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 (seal execution "Q") or the external flushing circuit (seal execution "V").

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 services (optional) are the following:

- Flushing for the double external mechanical seal (seal execution "Q")
- External flushing for the internal seal (execution "V").

The following conditions are recommended:

Ø Mechanical seal	Ø Flushing tubes	Speed	Flow rate l/ min	Pressure bar
Q 1" Gr. Ø 20	Ø 1/8" Gas male	1450-2900	0.2-0.5	See seal instructions
Q 2" Gr. Ø 28	Ø 1/8" Gas male	1450-2900	0.5-1.0	See seal instructions
Q 3" Gr. Ø 43	Ø 1/8" Gas male	1450-2900	0.7-2.0	See seal instructions
Q 4" Gr. Ø 55	Ø 1/4" Gas male/female	1450	0.8-2.2	See seal instructions
V 1 1/2" Gr. Ø 20-28	Ø 1/8" Gas male	1450-2900	0.2-0.5	0.5-1.0
V 3" Gr. Ø 43	Ø 1/8" Gas male	1450-2900	0.5-1.0	0.5-1.0
V 4" Gr. Ø 55	Ø 1/4" Gas female	1450	0.8-1.5	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 $0,5 \div 1$ 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 (execution "Q"- "V") 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 (execution "Q"- "V").

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.

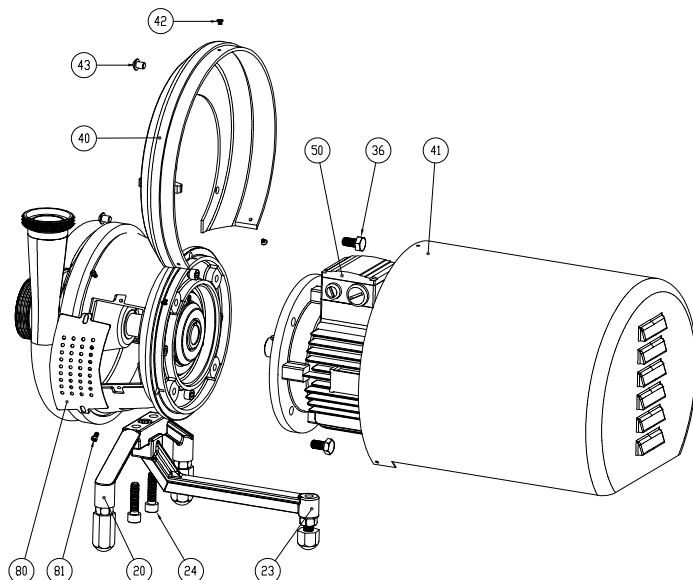
It is advisable to use one of the following liquids.

- Water with electrical conductivity of $100 \div 800 \mu\text{s/cm}$
- Water and glycol mixture
- Glycerine

15.0 - PUMP DISASSEMBLY

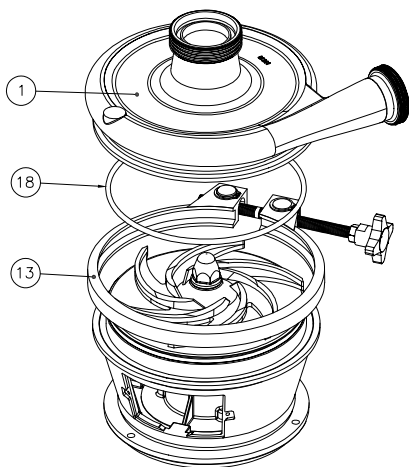
15.1 - DISASSEMBLY OF PUMP "T/W" EXEC. (Version with single mechanical seal)

1. Remove the screws (42-43-81) to remove the shroud (41), eccentric closure casing (40) and guards (80). Now free the motor (50) by unfastening the screws (36) and extract the pump. Disassemble the front and rear foot (20-23) by removing the screws (24).



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

2. Loosen the clamp (13) to pull out the pump casing (1) and O-ring (18).



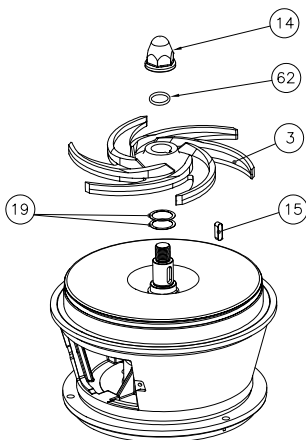
3. Remove the cap nut (14) (by turning it anti-clockwise) and the O-ring (62).

This operation must be performed with a pneumatic or fixed wrench, blocking the motor shaft with a pair of self-locking grip pliers.

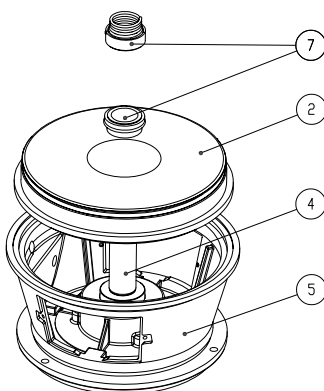
N.B.: if the motor has not been disassembled, the fan cover can be removed and the motor shaft blocked with self-locking pliers.

N.B.: see the tables for the impeller nut (14) and the tightening torques in the respective chapters 16.3 and 16.4 on page 34.

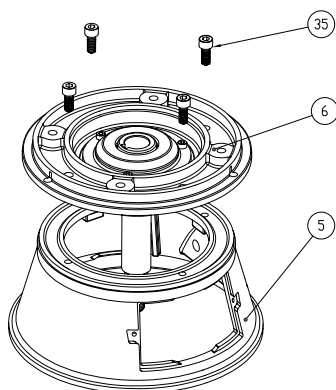
Remove the impeller (3), the key (15) and the shims (19) used to create the assembly allowance.



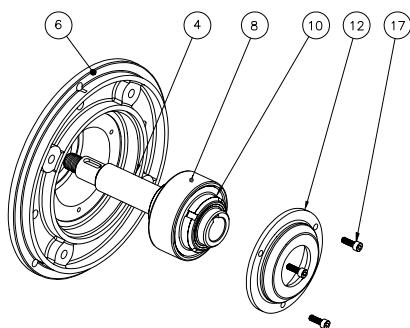
4. Extract the rotary part of the mechanical seal (7) turning the spring anti-clockwise. Separate the cover (2) from the lantern bracket (5), pull off the fixed part of the mechanical seal (7) housed on it.



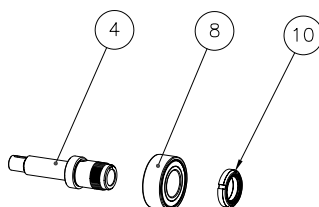
5. Turn it over to access the screws (35) which allow you to separate the support (6) from the lantern bracket (5).



6. Remove the bearing cover (12) pulling off the screws (17); extract the shaft (4) - bearing (8) - ring nut (10) unit from the support (6).

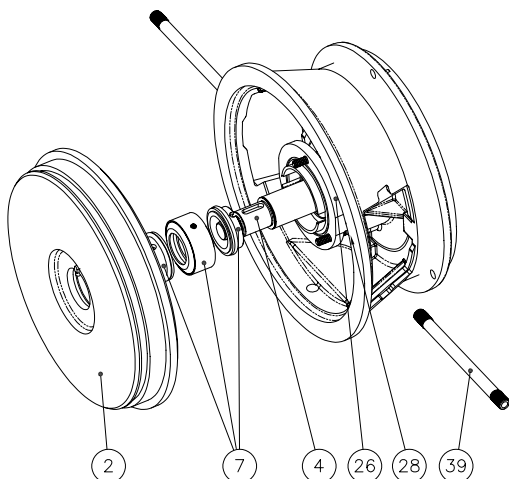


7. Unscrew the ring nut (10) and extract the bearing (8) from the shaft (4).



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

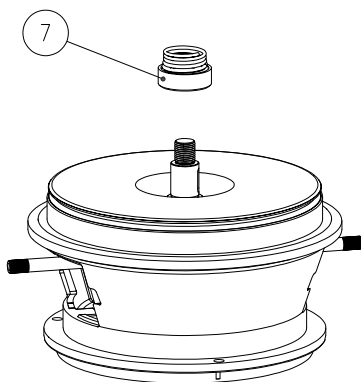
1. Perform the operations 1, 2 and 3 as described in the previous heading 15.1.
2. After having disassembled the flushing pipes (39) separate the seal box cover (26) from the cover (2) by unscrewing the screws (28). Pull the cover (2) off the lantern bracket (5) and proceed to disassemble the seal (7): separate the internal fixed part (7.1) from the cover (2), and, after loosening the grub screws, separate the rotating part (7.2) from the shaft (4), and detach the external fixed part (7.3) from the seal box cover (26).



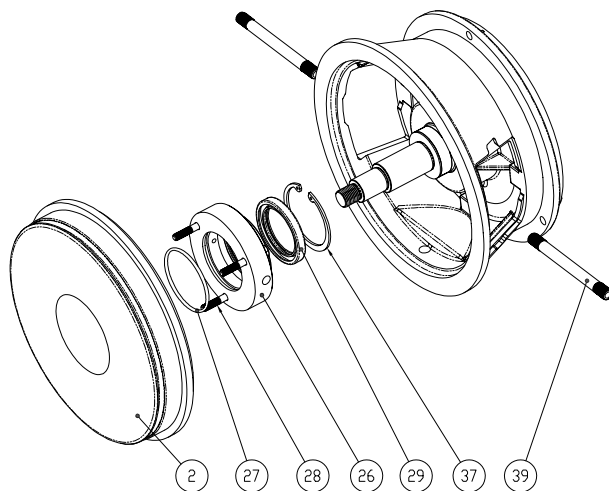
3. Perform the operations 4, 5 and 6 as described in the previous heading 15.1.

15.3 - DISASSEMBLY OF PUMP "V" EXEC.

1. Perform the operations 1, 2 and 3 as described in the previous heading 15.2.
2. Extract the rotary part of the mechanical seal (7) turning the spring anti-clockwise.



3. After having disassembled the flushing pipes (39) separate the seal box cover (26) from the cover (2) by unscrewing the screws (28). Disassemble the Seeger ring (37) and the radial mechanical seal (29). Remove the OR seal ring (27) from the cover (2).



4. Perform the operations 4, 5 and 6 as described in the previous heading 15.2.

16.0 - PUMP ASSEMBLY

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

Observing the positioning of the seals as described in paragraph 14.1, carry out the assembly operations in reverse order in relation to the previous chapter, heading 15.1, thus obtaining the sequence of steps needed to assemble the pump.

N.B.: Refer to the table (heading 16.3) to observe the assembly allowances..

16.2 - ASSEMBLY OF PUMP "Q" EXEC.

Observing the positioning of the seals as described in paragraph 14.2 for CS - CSX and paragraph 14.3 for CSK, carry out the disassembly operations in reverse order to the previous paragraph (15.1 for CS - CSX and 15.2 for CSK) thus obtaining the sequence of steps needed to assemble the pump.

N.B.: See the table on the following page (par. 16.3) for the impeller assembly allowances, tables 1 and 2 in par. 14.2 for the assembly measurements of the mechanical seal with reference to CS - CSX pumps and tables 3 and 4 of par. 14.3 for the assembly measurements of the mechanical seal with reference to CSK pumps.

16.3 - REFERENCE TABLE FOR IMPELLER NUT DIMENSIONS

Shaft unit	Pump size	Thread size	Tightening torque [Nm]
CS 1° gr.	25-145 / 25-175 32-110	M 10 (CH 20)	20-25
CS 2° gr.	32-145 / 32-175 / 32-210 40-145 / 40-175 / 40-210 50-145 / 50-175 / 50-210 65-145 / 65-175	M 16 (CH 26)	60-70
CS 3° gr.	32-260 40-260 50-260 65-210 / 65-260 80-175 / 80-210 / 80-260 / 80-310 100-210 / 100-260 / 100-310 125-260	M 18 (CH 36)	70-80
CS 4° gr.	125-350 150-350	M 22 (CH 50)	100-120

16.4 - REFERENCE TABLE FOR CLAMP TIGHTENING TORQUES

Pump size	Clamp code	Thread size	Tightening torque [Nm]
32-110*	TGJAA0016*	M 10	10-15*
25-145 / 32-145 / 40-145 50-145 / 65-145	TGJAA0006	M 10	20-25
25-175 / 32-175 / 40-175 50-175 / 65-175 / 80-175	TGJAA1121	M 12	25-30
32-210 / 40-210 / 50-210 65-210 / 80-210 / 100-210	TGJAA0009	M 12	25-30
32-260 / 40-260 / 50-260 65-260 / 80-260 / 100-260 125-260	TGJAA0014	M 12	30-35
80-310 / 100-310	TGJAA0018	M 12	30-35

* Tightening torque only valid without butterfly nut

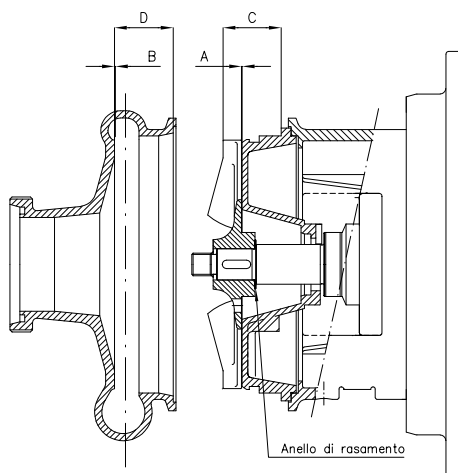
16.5 - REFERENCE TABLE FOR IMPELLER - COVER ASSEMBLY ALLOWANCE

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

Value B represents the impeller/casing assembly allowances and C is the impeller/cover distance with the adjusting shims (pos. 19).

For the internal depth of the casing, the two values B and C are added together.

	CS-CSX PUMP CSK	Dimensions					CS-CSX PUMP CSK	Dimensions			
		A	B	C	D			A	B	C	D
1° Gr.	25-145	0.3	0.3	34.9	35.2	2° Gr	65-145	0.5	0.3	51.0	51.3
	25-175	0.3	0.3	34.3	34.6		65-175	0.4	0.4	48.9	49.3
	32-110	0.3	0.4	29.8	30.2		65-210	0.4	0.4	51.9	52.3
2° Gr.	32-145	0.3	0.3	37.8	38.1	3° Gr	65-260	0.5	0.5	49.5	50.0
	32-175	0.3	0.4	36.3	36.7		80-175	0.4	0.4	64.4	64.8
	32-210	0.3	0.5	37.3	37.8		80-210	0.4	0.4	56.9	57.3
3° Gr.	32-260	0.4	0.4	41.4	41.7	4° Gr	80-260	0.5	0.5	54.0	54.5
	40-145	0.3	0.4	38.8	39.2		80-310	0.5	0.5	54.9	55.3
	40-175	0.4	0.4	39.4	39.8		100-210	0.5	0.5	64.0	64.5
2° Gr.	40-210	0.4	0.4	38.9	39.3		100-260	0.5	0.5	57.8	58.3
	40-260	0.4	0.4	42.4	42.8		100-310	0.5	0.5	61.9	62.3
3° Gr.	50-145	0.4	0.4	43.9	44.3		125-260	0.5	0.5	63.9	64.3
	50-175	0.4	0.4	40.9	41.3		125-350	0.5	0.5	74	74.5
	50-210	0.4	0.4	40.9	41.3		150-350	0.5	0.5	86	86.5
3° Gr.	50-260	0.4	0.4	44.9	45.3						



17.0 - BEARINGS MAINTENANCE

17.1 - SERIES CS BEARINGS MAINTENANCE

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.

17.2 - SERIES CS - CSX BEARINGS MAINTENANCE WITH SUPPORT GR. 160 - 200

The bearings of CS - CSX 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.

“CS” series pumps (Fig. 1)



Grease
nipples

“CSX” series pumps (Fig. 2)



In CR series pumps with housing size 160 ÷ 200 (11 ÷ 22 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 - pict. 2).

Each time the bearing is disassembled, replace the grease lip seal (pos.32 for CS pumps and pos. 206-207 for CSX pumps, split lip seal), making sure the seat of the seal 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 CS-CSX		32 40 50 65	32 40 50 65	32 40 50	80	65 80 100	32 40 50 65 80 100 125	80 100	Lubrication interval (service hours)	Q.ty grease (grams)
		145	175	210	175	210	260	310		
Detail		145	175	210	175	210	260	310		
Motor IEC 160/180	Bearing	3212 A C3			3214 A C3			8000 ÷ 5000		20
Motor IEC 200 30 kW 2 poles (CSX with 2 bearings)		---			C 2216			1500** ÷ 500***		23
		---			6216 A					18

** Bearing temperature < 60°C and low level of contamination.

*** Bearing temperature > 60°C and medium level of contamination.

17.3 - SERIES CSK BEARINGS MAINTENANCE

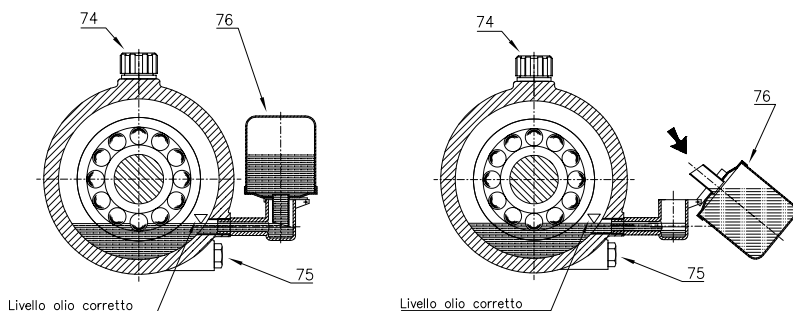
The bearings of the pump support are lubricated using the oil bath method.

The pump is supplied with no oil in the bearing support. Fill the support before starting the pump, using the oil supplied by C.S.F., or another oil of equivalent type.

To fill up, proceed as follows: with the pump stopped, unscrew the bleed cap (pos. 74) and rotate the reservoir of the constant-level oiler (pos. 76) as shown in the figure. Now pour oil in through the bleed hole until the oil reaches the level of the connection with the oiler, as shown in the figure. Partially fill the reservoir and return it to the closed position. Screw the bleed cap back on. After a short while, check to see if the level in the reservoir has dropped: it is important to keep the right level in the reservoir. It is important to check the oil level periodically, topping it up if necessary, without exceeding the level shown in the figure. An excessive amount of oil will cause the temperature of the bearings to increase.

For bearings operating at temperatures of up to 60°C, it is advisable to carry out the first oil change after about 300-500 service hours and subsequent oil changes every 8,000 service hours (in any case, always change the oil once a year). For bearings operating in a higher temperature range, oil changes must be more frequent; consult CSF Inox or follow the SKF instructions). To change the oil in the bearing support, proceed as follows: unscrew the drain plug (pos. 75) and drain off the spent oil into a suitable container. Replace the drain plug and fill with fresh oil as per the procedure described above.

BRAND	TYPE	VISCOSITY INDEX	ISO GRADATION
MOBIL	DTE OIL LIGHT	112	32



Q.TY OF OIL EXPECTED

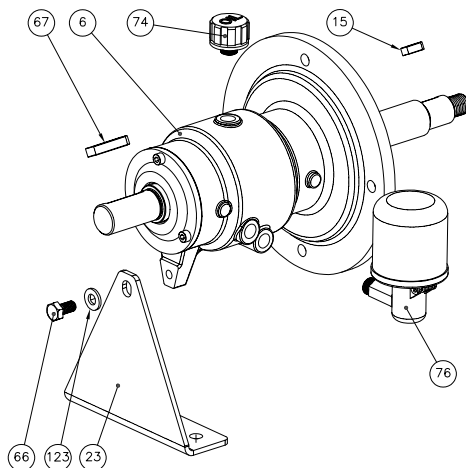
CSK 2° Gr. = 1 0,1 of oil

CSK 3° Gr. = 1 0,3 of oil

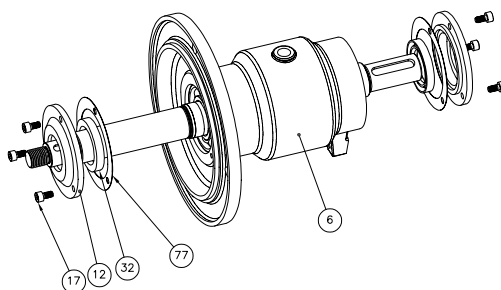
CSK 4° Gr. = 1 0,5 of oil

17.4 - CSK PUMP DISASSEMBLY

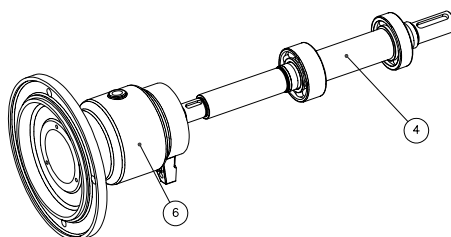
1. Separate the vent plug (74), the oiler (76), the rear foot (23) with a screw and washer (66123) and the flaps (15-67) from the support of the bearings (6).



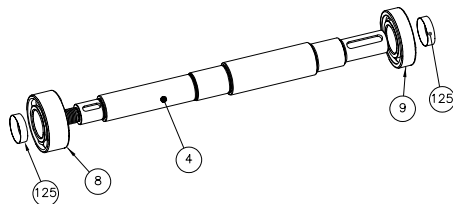
2. Unscrew the screws (17) and remove the front and rear bearing covers (12) with seal rings (32) and gaskets (77).



3. Extract the shaft (4) complete with bearings, from the support (6).



4. Complete disassembly be removing the Speedi-Sleeve rings (125) and the bearings (8-9) from the shaft (4).

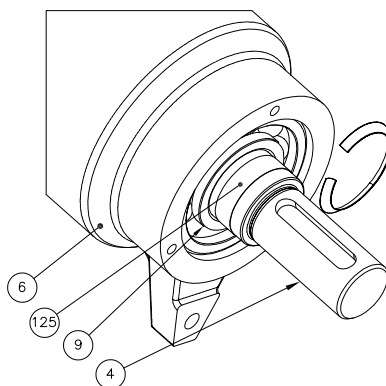
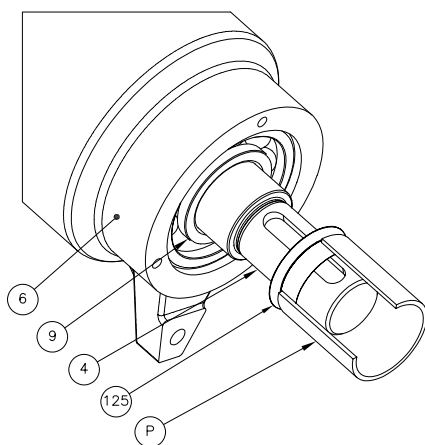


17.5 - CSK PUMP ASSEMBLY

Perform the disassembly steps in inverse order to assemble the support of the bearings.

N.B.: After replacing the bearings (8-9), insert the Speedi-Sleeve rings (125) using a PTFE hollow drift (P).

Then remove the frame of the rings with suitable pliers.



TYPE OF BEARINGS ON THE PUMP:

Pump CSK		32 40 50 65	32 40 50 65	32 40 50	80	65 80 100	32 40 50 65 80 100 125	80 100	125 150
Detail		145	175	210	175	210	260	310	350
Bearings	Front	3206			3309 C3			3311 C3	
	Rear	6206			6309 C3			6311 C3	

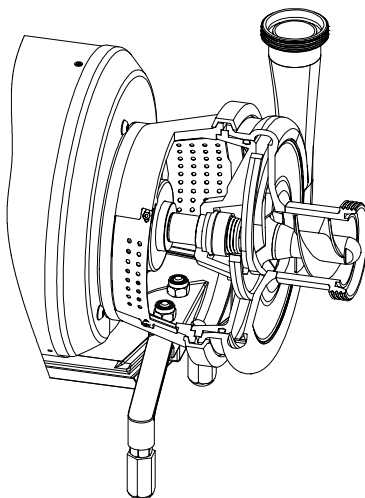
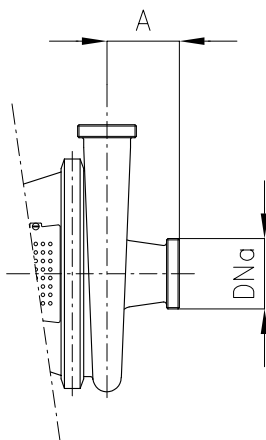
18.0 - SPECIAL EXECUTIONS

18.1 - EXECUTION WITH INDUCER (CS - CSK - CSX)

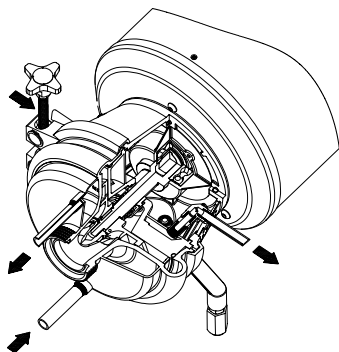
In particularly critical inlet suction conditions with low available NPSH values, which are encountered for example in high vacuum extraction applications, liquids near to boiling point and limited available head, the special version equipped with inducer on the intake port can be used. This device is arranged immediately upstream of the impeller to reduce the NPSH value requested by the pump. It is advisable to always contact CSF INOX engineers for this type of application.

N.B.: Pumps with inducer have a pump casing with increased suction port as indicated in the table:

Pump type	DNa	A	Pump type	DNa	A
CS 32-145	65	80	CS 65-145	100	88
CS 32-175	65	85	CS 65-175	100	105
CS 32-210	65	85	CS 65-210	100	107
CS 32-260	65	98	CS 65-260	100	108
CS 40-145	65	85	CS 80-175	125	135
CS 40-175	65	89,5	CS 80-210	125	127,5
CS 40-210	80	75,5	CS 80-260	125	135
CS 40-260	80	106	CS 80-310	125	135
CS 50-145	80	85	CS 100-210	150	100
CS 50-175	80	85	CS 100-260	150	100
CS 50-210	80	85	CS 100-310	150	100
CS 50-260	80	90	CS 125-260	-	-



18.2 - EXECUTION WITH HEATED CASING AND COVER (CS - CSK - CSX)



When handling high viscosity products with a tendency to harden or if it is necessary to maintain the processing temperature, cavities are created in the casing and cover through which hot or cold water can circulate.

N.B.: DO NOT USE STEAM AS A HEATING LIQUID.

Max. temperature = 90°C

Max. pressure = 1.5 Bar

CASING circulation sleeves table (CS-CSX-CSK)

Pump casing	Sleeve GAS	Pump casing	Sleeve GAS
25-145	1/8" G	50-260	3/8" G
25-175	1/8" G	65-145	3/8" G
32-110	1/8" G	65-175	3/8" G
32-145	3/8" G	65-210	3/8" G
32-175	3/8" G	65-260	3/8" G
32-210	3/8" G	80-175	3/8" G
32-260	1/4" G	80-210	3/8" G
40-145	3/8" G	80-260	3/8" G
40-175	3/8" G	80-310	3/8" G
40-210	3/8" G	100-210	3/8" G
40-260	3/8" G	100-260	3/8" G
50-145	3/8" G	100-310	3/8" G
50-175	3/8" G	125-260	3/8" G
50-210	3/8" G		

COVER circulation sleeves table (CS-CSX-CSK)

Cover unit	Pump size	Sleeve GAS	Cover unit	Pump size	Sleeve GAS
1° gr. 145	25-145	1/4" G	3° gr. 175	80-175	1/4" G
1° gr. 175	25-175	1/4" G	3° gr. 210	65-210 80-210 100-210	1/4" G
1° gr. 110	32-110	1/8" G			
2° gr. 145	32-145 40-145 50-145 65-145	1/4" G			
	32-175 40-175 50-175 65-175	1/4" G	3° gr. 260	32-260 40-260 50-260 65-260 80-260 100-260 125-260	3/8" G
2° gr. 210	32-210 40-210 50-210	1/4" G		80-310 100-310	3/8" G

18.3 - CSD SERIES - ASEPTIC SANITARY CENTRIFUGAL PUMP

Seals

The "V" execution sealing system consists of a protected, balanced internal mechanical seal, in compliance with EN 12756 - ISO 3069 standards, in direct contact with the product, and an external, radial type seal for the flushing fluid.

Flushing is designed to create a protective barrier.

"V" seal chamber flushing

Use sterile condensate with a flow rate of 0.5 - 1 l/min and pressure ≤ 1 bar.

The aseptic version of the CS series is made with a protective steam barrier between the product and the external environment.

It consists of two different flushing systems: one with superheated water for the mechanical seal and one with steam for those parts of the pump in contact with the product.

Technical data of circulated fluid

Steam maximum pressure	: 3 Bar
Steam maximum temperature	: 130°C

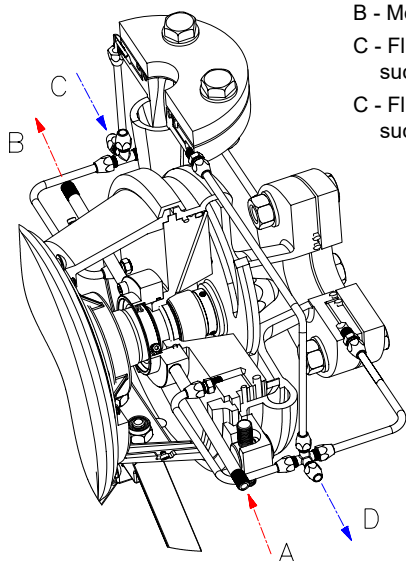
Connection of flushing circuits: 1/8" GAS

A - Mechanical seal flushing inlet

B - Mechanical seal flushing outlet

C - Flushing inlet for pump casing/cover barrier and flanges, suction and delivery ports

D - Flushing outlet for pump casing/cover barrier and flanges, suction and delivery ports



Protective steam barrier

The piping that carries the steam must be connected to the inlet fitting "C" on the pump. By circulating inside the circuit set up between the casing/cover and the suction and delivery flanges, the steam creates a sterile barrier to protect the pumped fluid. The steam recovery pipe must be connected to steam outlet fitting "D".

The piping that carries the superheated water to cool the radial seal must be connected inlet pipe "A" and outlet pipe "B".

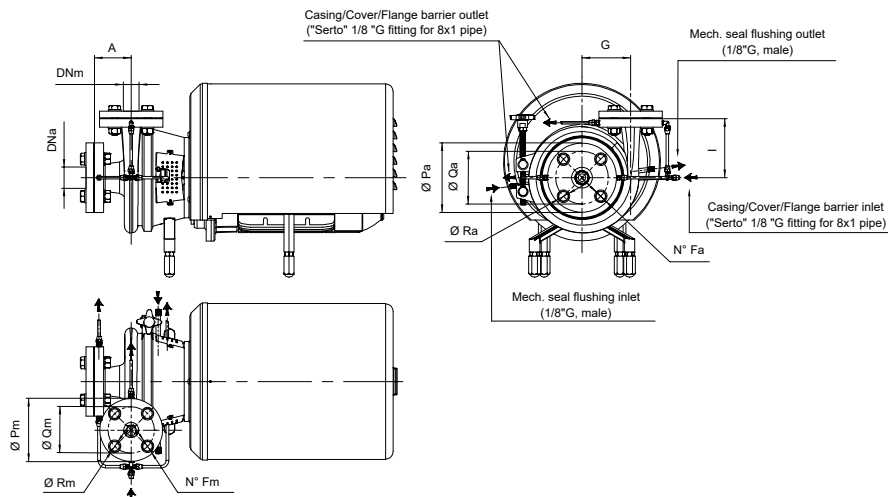
N.B.: For correct pump operation, it is important that flushing liquid beings to circulate inside the chamber BEFORE starting the pump and ends only after the pump has been turned off.

The steam outlet connection D must be made to create a closed circuit to avoid contact with the atmosphere.

Refer to the tables on the following pages for the overall dimensions of the CSD pumps.

TABLE OF OVERALL DIMENSIONS OF FLANGES AND FLUSHING FITTINGS

These measurements are not binding - DN = Flanges EN 1092-1 PN16 - exec. with IEC - EN standard motors



Pump type	IEC motor frame size	DNa	DNm	A	G	I	Ø Pa	Ø Qa	Ø Ra	Ø fa	Ø Rm	Ø Qm	Ø Rm	Ø fm
CSD 32-145	80	40	32	80	85	135	150	110	18	4	140	100	18	4
	90													
	100													
	112													
	80													
CSD 32-175	90	40	32	80	95	135	150	110	18	4	140	100	18	4
	100													
	112													
	80													
	90													
CSD 32-210	100	40	32	88	110	155	150	110	18	4	140	100	18	4
	112													
	132 M-S													
	132 MB													
	160													
CSD 32-260	90	50	32	90	140	177	165	125	18	4	140	100	18	4
	100													
	112													
	132 M-S													
	132 MB													
CSD 40-145	160	50	40	80	90	133	165	125	18	4	150	110	18	4
	80													
	90													
	100													
	112													
CSD 40-175	80	50	40	80	95	140	165	125	18	4	150	110	18	4
	90													
	100													
	112													
	132 M-S													
CSD 40-210	132 MB	50	40	80	115	165	165	125	18	4	150	110	18	4
	160													
	90													
	100													
	112													
CSD 40-260	132 M-S	50	40	100	145	167	165	125	18	4	150	110	18	4
	132 MB													
	160													
	180													
	90													

Pump type	IEC motor frame size	DNa	DNm	A	G	I	Ø Pa	Ø Qa	Ø Ra	Ø fa	Ø Rm	Ø Qm	Ø Rm	Ø fm
CSD 50-145	80	65	50	86	95	145	185	145	18	4	165	125	18	4
	90													
	100													
	112													
	132													
CSD 50-175	80	65	50	80	100	150	185	145	18	4	165	125	18	4
	90													
	100													
	112													
	132 M-S													
	132 MB													
	160													
CSD 50-210	90	65	50	80	120	170	185	145	18	4	165	125	18	4
	100													
	112													
	132 M-S													
	132 MB													
	160													
	180													
CSD 50-260	100	65	50	90	145	175	185	145	18	4	165	125	18	4
	112													
	160													
	180													
CSD 65-145	80	80	65	79	112	145	200	160	18	8	185	145	18	4
	90													
	100													
	112													
	132 M-S													
	132 MB													
	160													
CSD 65-175	90	80	65	80	120	150	200	160	18	8	185	145	18	4
	100													
	112													
	132 M-S													
	132 MB													
	160													
	180													
CSD 65-210	90	80	65	90	135	175	200	160	18	8	185	145	18	4
	100													
	112													
	160													
CSD 65-260	100	80	65	100	155	205	200	160	18	8	185	145	18	4
	112													
	132 M-S													
	132 MB													
	160													
CSD 80-175	100	100	80	100	139	164	220	180	18	8	200	160	18	8
	112													
	132 M-S													
	160													
	180													
CSD 80-210	100	100	80	100	145	185	220	180	18	8	200	160	18	8
	112													
	132 M-S													
	160													
CSD 80-260	100	100	80	100	165	209	220	180	18	8	200	160	18	8
CSD 100-210	112	125	100	111	161	214	250	210	18	8	220	180	18	8
	132													
CSD 100-260	132 MB	125	100	115	186	216	250	210	18	8	220	180	18	8
	160													
CSD 100-260	180	125	100	115	186	216	250	210	18	8	220	180	18	8
	180													

19.0 - CLEANING PROCEDURE



Use suitable personal protective equipment during cleaning operations.

19.1 - 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.

19.2 - 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 itself.

If the pump needs to be sent C.S.F. Inox for maintenance/repair work, fill in the Declaration of Decontamination.

19.3 - 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 food 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).

19.4 - 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.

CAUTION:

- During the CIP process there are thermal expansion: take care that there are not rapid temperature variations.
- It is recommended to carry out washing with a flow speed at the inlet port of at least 1.5 m/s.
- Chemical agents at high temperature can cause potential health risk: respect the safety regulation and use protection devices.
- Control the concentrations and temperature of chemical agents during the CIP.
- 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 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 process your 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: _____ Viscosity: _____ [mm²/s]
 [m³/h]

* Product and warnings:

	Product/ concentration	Flammable	Toxic	Corrosive	Hazardous/ irritant	Other**	Harmless
Processing product		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cleaning product		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parts cleaned by		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

** 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 returning item/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

20.0 - 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.

20.1 - 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.

20.2 - 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.

20.3 - 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, cast iron with corrosion proof treatment
- 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.

TECHNICAL SERVICE

0522 869832



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