



Since 1904

CERPELLI COMMERCIALE S.r.l

Via Biagioni 487
55047 Querceta (LU), Italy
Tel ++ 39 (0)584 742040 – Fax ++ 39 (0)584 767408
<http://www.cerPELLIpompe.com>

Job number	20030
Pump type	C2PO 25x28
Date	30/06/07

Data sheet, drawings and list of parts

Pump type C2PO 20x28	Client SAMER
Serial number 173345	Order no 255-06
CerPELLI's Job 20030	Item / Plant -----



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Job number	20030
Pump type	C2PO 25x28
Date	30/06/07

Pump Characteristics:

Pump type.....	: C2PO 25x28
CerPELLi Job.....	: 20013
Serial number.....	: 173345

Type of pump.....: Horizontal centrifugal pump, axially split casing type, double suction

Pump characteristics:

Service.....: Secondary cooling pump
Pumped fluid:.....: Acqua
Pumping temperature..... (°C).....: 30
Specific gravity..... (kg/m³).....: 995
Viscosity..... (cst).....: 1
Suction pressure..... (bar a).....: 0,77
Delivery pressure..... (bar).....: 1,94
Head..... (mcl).....: 23
Pump capacity..... (m³/h).....: 800
Pump efficiency..... (%).....: 80
Pump speed..... (rpm).....: 1780
Pump rated power..... (kW).....: 62,4 rated
NPSHr..... (m).....: 5

Pump gross weight.....: 1450 kg
Pump rotation.....: CW
Type shaft seal.....: Mechanical
Type of coupling.....: Elastic (execution made in three pieces) type ACS 6
Type of lubrication.....: Oil

Electric motor

Type.....: ABB type M2BAT 280 SMA4
Rated power..... (kW).....: 84

Annex documents

Outline drawing.....: 27430
Section drawing.....: 27454
Instruction manual.....: C 331 rev.04
Coupling instruction manual.....: ACS it-in ed1 rev1
Electric motor instruction manual.....: Manual 12-2004
Certificates

Remarks





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Job number	20030
Pump typ ^e	C2PO 25x28
Date	30/06/07

Pump part list:

Section drawing no. 27454

Part. N.	Installed Q.ty	Description	Material
1213	1	Pump casing	A 743 Gr.CF3M
1214	1	Cover pump casing	A 743 Gr.CF3M
1510	2	Casing wear ring	A 276 Tp.316L (1.4404)
2100	1	Shaft, pump	A 479 Tp.316L (1.4404)
2200	1	Impeller	A 743 Gr.CF3M
2310	2	Impeller wear ring	A 276 S 31803
2450	2	Shaft sleeve	A 479 Tp.316L (1.4404)
2520	2	Spacer ring	A 276 Tp.316L (1.4404)
2530	2	Two half ring	A 276 Tp.316L (1.4404)
2540	2	Shaft sleeve	A 276 Tp.316 (1.4401)
2540.1	1	Deflector	B 584 C 83600
3011	1	Radial ball bearing	
3012	1	Radial roller bearing	
3200	2	Bearing housing	A 48 CL35
3261	2	Bearing cover	A 48 CL35
3262	2	Bearing cover	G 25
3266	1	Bearing end cover	G 25
3712	2	Locknut	5S UNI 3740
3713	2	Safety washer	R 40
3854	2	Oil filler plug	Plastica
3855	2	Constant level oil	
4200	2	Mechanical seal	
4210	2	Flange meccanica seal	A 276 Tp.316 (1.4401)
4271	2	Sleeve mechanical seal	A 276 Tp.316 (1.4401)
4510		Gasket	Motorsil tipo D
4610	2	Gasket mechanical seal	NBR
4610.1	2	Gasket mechanical seal	NBR
6470	2	Pin	A4 UNI 6900
6470.1	2	Pin	A4 UNI 6900
6470.2	2	Pin	A276 tp. 316L
6515	7	Plug	A 403 WP316
6515.1	2	Plug	A 105
6515.2	4	Plug	A 105
6570	8	Grub screw	A4 UNI 6900
6570.1	9	Grub screw	A4 UNI 6900
6573	23	Stud bolt	A4 UNI 6900
6573.1	4	Stud bolt	A4 UNI 6900
6573.2	8	Stud bolt	A4 UNI 6900
6576	10	Screw	8.8 UNI 3740
6576.1	2	Screw	A4 UNI 6900
6578	12	Screw	8.8 UNI 3740
6578.1	12	Screw	8.8 UNI 3740
6580	29	Nut	A4 UNI 6900
6580.2	8	Nut	A4 UNI 6900
6710	1	Key	AISI 316
6731	2	Key	AISI 316
6742	1	Key	AISI 316



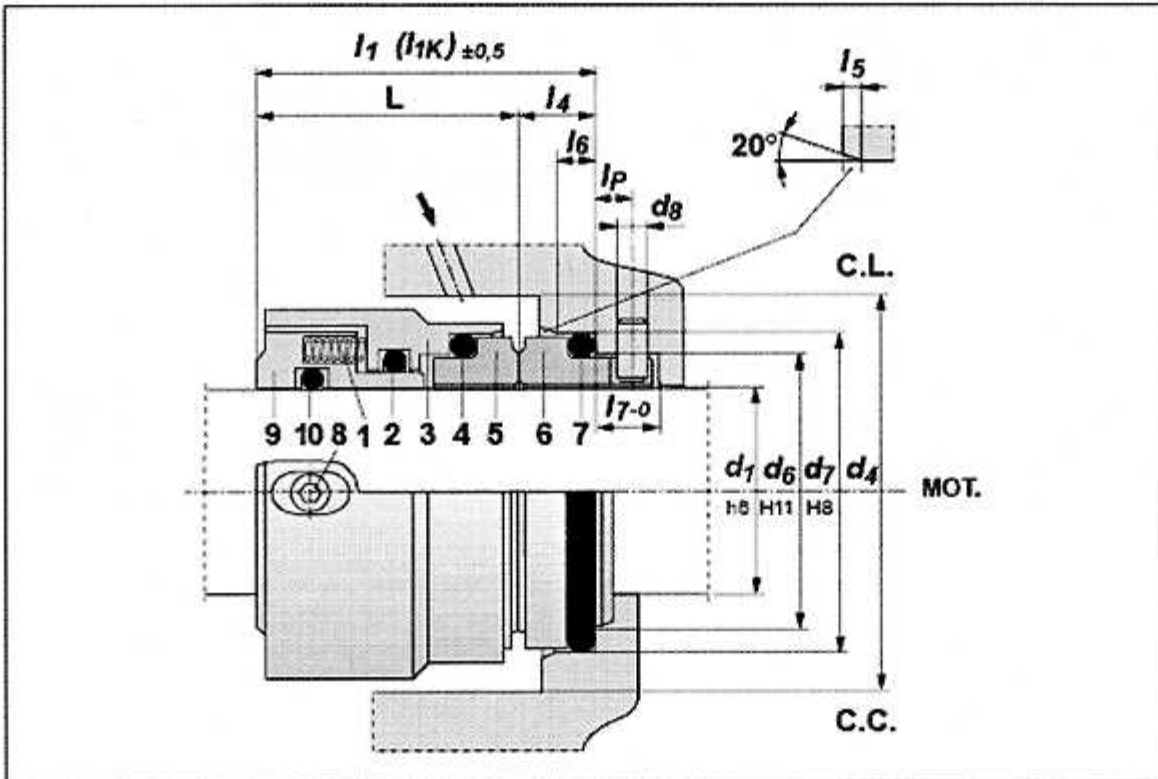
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Job number	20030
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MECHANICAL SEAL DRAWING



POS. TYPE	COMPONENTS
1	Spring
2	Shaft gasket (O-ring)
3	Frame
4	Rotary gasket (O-ring)
5	Rotary seal ring
6	Stationary seal ring
7	Stationary gasket (O-Ring)
8	Crub screws
9	Balanced sleeve
10	Sleeve gasket (O-Ring)

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Date	04-04-03

Operating and Maintenance Instructions with Dismounting and Mounting Procedures for Centrifugal pump type C2PO



This Operating and Maintenance instructions contains information from the pump manufacturer. They may need to be supplemented by instructions of the operator company for its personnel.

The instructions of this handbook do not consider the specific information concerning to operation and maintenance of the process plant into which the pump is integrated.

Such information can only be given by persons responsible for construction and planning of the plant

Some specific instructions concerning the operations or the installation maintenance where the pump is integrated have the priority on the pump builder instructions.

It is always necessary to refer also to the instructions concerning the installation builder operations and maintenance.



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1.0 GENERALITIES

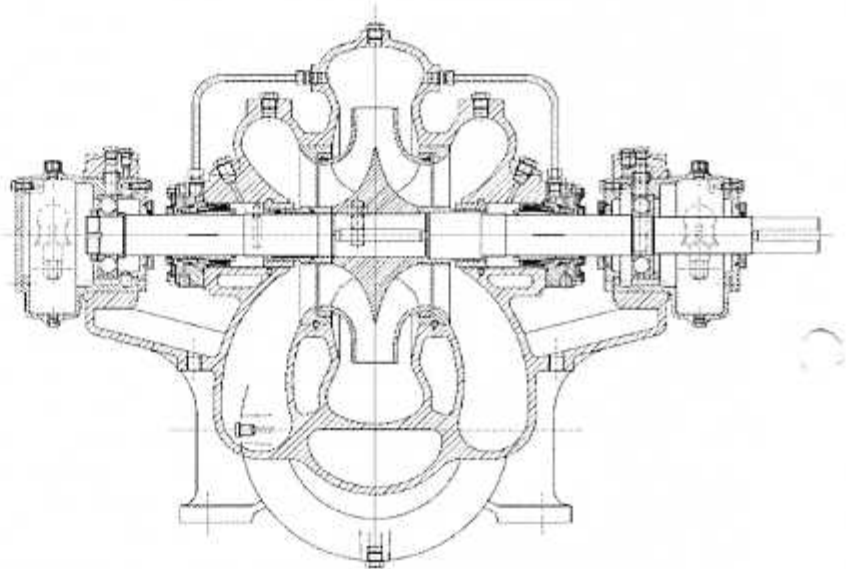
1.1 Pump description

The C2PO pumps are centrifugal, horizontal, single stage, double suction, axially split, between bearing construction. This type of pump is designed for the following applications.

This type of pumps is normal used for civil or industrial plants with the following services:

Acqueducts, Irrigation, Circulating, for marine environment, Firefighting.

CASING is axially split with upper and lower half casing doweled and bolted together. Flange suction and discharge connection are located in lower half casing.

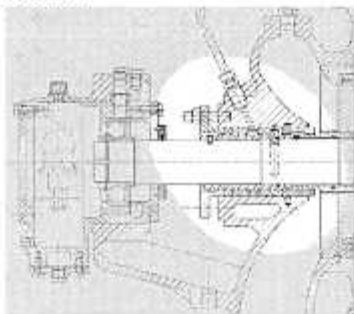


Removal of upper half casing permits inspection, maintenance and removal of the complete rotating element without disturbing piping, or pump and driver alignment.

All locks for internal renewable parts and integrally cast bearing housing seats are burred in one machined set up, this assures permanent positive alignment.

IMPELLER is closed type, double suction design so that head versus capacity curve is stable. A large eye area insures low NPSHR requirement and reduces cavitation possibilities. External surfaces are machined, internal or waterways are hand finished. All impellers are statically and dynamically balanced and keyed on shaft.

WEAR RINGS All pumps are fitted with renewable casing wear rings. Rings permit easy maintenance of proper running clearance, to minimise leakage between discharge and suction chambers of casing. Casing wear rings held radially by tongue and groove lock in lower half casing. Renewable wear rings supplied when ordered. This type of pump must be supplied with wear rings installed also on impeller and locked with stainless steel set screws.



SEAL this type of pump can be mounted indifferently mechanical seal also with special design in according to API 610 or API 682 and Packing seal.

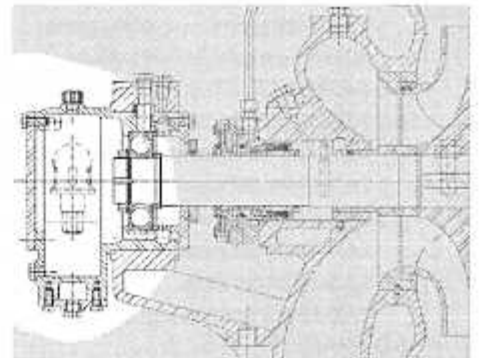
SHAFT AND SHAFT SLEEVE. Sleeves held by nut threaded on shaft or proper key. Nuts tighten against rotation and further secured by set screws. O-ring seal at each end sleeve keep shaft dry and prevents shaft failure due to corrosion. Key at impeller and coupling fits have radius fillet to reduce concentration of stresses.

BEARINGS Oil lubricated ball bearing with special device like constant level oiler that maintain proper level in oil reservoir are of

standard design. Grease lubricated ball bearing available on request. Bearing housing can be supplied also with separated cooling chamber for high temperature services

SUCTION AND DISCHARGE FLANGES are ANSI 150 rated with 1/16 " raised face for steel casting. Upon request pump can be furnished with flanges of different standards like UNI, DIN, BS and others.

COUPLING is flexible type without spacer (if installed) which allows removal of complete rotating assembly without disconnection of suction and discharge pipework and driver, that remain bolted to the baseplate.





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1.4 Guarantee

All the details that compose the pump are strictly checked during the productive process, the pump meltings are subjected to the pressure test (hydrostatic test) and after the assembling, the whole equipment is subjected to a functional test in order to verify the contractual conditions.

1.4.1 Guarantee general conditions

The firm engages itself to provide systems conformable to the agreement and without vices that could compromise the use of the systems to which they are designed.

Our pumps are guaranteed for 12 months from the starting, or rather, within 18 months from the receiving the notice informing the goods is ready to be forwarded.

The guarantee does not cover damages due to adventitious chance, major forces, negligence, inexperience, want of maintenance, irrational use of the machines, not authorised changes and repairs.

The materials are not guaranteed against every kind of construction vice or defect, and for this reason, during the above mentioned period, we engage ourself to substitute or to repair as soon as possible the failed or faulty pieces.

The delivery freights will be on our account and our guarantee does not cover the required manual labour for the possible substitution.

The guarantee does not cover the normal fretting parts or parts that can be fretted or corroded by the peculiar substance of the pumped liquid.

If the machine is not used within 18 months since its preparation, it could be required the intervention of a technician of ours for a supervision and a possible machinery restoration and the freight will be on the customer account.

After this intervention and our approval, the guarantee could have effect, again, for further 6 months.



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2.0 GENERAL REGULATIONS OF THE HANDBOOK

This handbook has been realized in order to establish a reference for :

- the use safety
- the pumps installation and maintenance intervention
- starting, laying and pumps switching-off procedures,

and it has to be considered an integrating pump part and of all the engines that the Commercial CerPELLi Company Srl, here named Pumps CerPELLi, and has to be paired off to this for the life necessary till its breaking down.

It is necessary to retain carefully this handbook that has to be available for the skilled staff in charge of the pump use and maintenance, which is responsible for the operations executed on it and, for this reason, it must be CAREFULLY read before operating.

In the Directive 89/392/CEE and following up dates is defined that, with the term "Operator" means skilled whose experience, culture and the laws concerning the fire prevention knowledge, were authorized by the safety responsible to act if it is necessary to solve the problem efficaciously. It is also necessary that the operators have the first aid ability.



It is expressly FORBIDDEN the use of the pump to the staff that has not the required qualifications.

The pump must be used exclusively for the specified situation contained on the confirmation for which CERPELLI PUMPS has arranged the execution, the construction materials and the running tests which make the pump perfectly equivalent to the requests.

For this reason it CANNOT be used for situations different from the ones specified on the confirmation.

In case of working conditions change it is absolutely necessary to keep in touch with Pumps CerPELLi, which decline every kind of responsibility for uses different from those provided for by the contract.

If the pump constructive and working data are not available, they will be required to Pumps CerPELLi defining the matricula number pressed on the plate fixed on the pump. It has to be always used the pump matricula number to require the technical information and/or to order replacement pieces.

Besides, the user has to verify the right environmental conditions (for example frost or high temperature) with the pump will be set and could condition its performances and/or seriously damage it.

3.0 SECURITY REGULATIONS



In this chapter all the precautions that has to be carefully respected to avoid serious damages to persons and/or to the pump are listed:
damages to the installation vital parts
damages to the persons due to electrical, mechanical and chemical problems.

The security regulations contained in other chapters should have to be observed in addition to those listed in this page.

- Follow **ALWAYS** the regulations and the use provided for on the pump confirmation.
- The pump engine electrical connections must be **ALWAYS** executed by the authorized and skilled staff following the current regulations.
- The intervention on the pump must be **ALWAYS** executed by 2 persons at least.
- Get near the pump **ALWAYS** with the right wears (to avoid wide sleeve wears, ties, necklaces, ecc.) and/or a protection equipment (helmet, glasses, gloves, shoes for the prevention of industrial accidents, ecc.) fit for the operation to do.
- Disconnect **ALWAYS** the engine from the feeding installation, for example, taking away voltage to the line, when it is necessary to interfere on it.
- The pump must be **ALWAYS** stopped before touching it for every reason.
- The pump has **NEVER** to be warm when somebody is working on it.
- Reset **ALWAYS** the security regulations, that sometimes are kept away to intervene on the pump
- Do **NEVER** touch the pump and/or the pipings connected to it when there is the warm fluid transport more than 80°C.
- Be **ALWAYS** careful in touching a transporting pump or a pump that has transported toxic liquids and/or acids and/or dangerous substances.
- Arrange **ALWAYS** a fire-fighting equipment in the neighbourhood.
- **NEVER** use the pump in a sense opposed to the expected and rotation sense and it is showed on it.
- Do **NEVER** introduce the hands or the fingers into the holes and/or into the pump group openings.
- Do **NEVER** get on on the pump and/or the pipings connected to it.
- The pump and the pipings connected to it do **NEVER** be in pressure when it is necessary to intervene on it.
- Maintain **ALWAYS** the surface of the pump cleaned by the powder and/or by greases to remove every possibility of self supporting combustions due to the surfaces overheating.
- Observe **ALWAYS** the regulations imposed by the local specifications.

Besides, in the pump there are some components that can cause some dangers to the persons who keep in touch with them even during the normal maintenance and/or use procedures:

Component	Use	Correlated dangers
Oil and/or grease	The bearing boxes lubrication	Skin and eyes inflammation.
Plastic and elastomer components	O-ring, V-ring	Smoke release in case of overheating.
Aramididic fibre	Packing rings	Emission of harmful powder, smoke release in case of heating.
Varnisch	External surface of the pump	Smoke and powder release in case of heating, flammability
Pump	*	Noise-exposure

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4.0 EMERGENCY STOP

If the pump does not work well and/or there are some transported fluid loss, it is necessary to take off immediately the feeding voltage following the pump stop procedures and informing the installation responsible staff.

So, it is necessary to intervene as showed in chapter number 2.0 and, at least, two persons have to be particularly careful to the dangerous and/or harmful fluids for the health which are transported from the pump.



If somebody keep in touch and/or inhale some transported dangerous substances, it is necessary to take immediately the specific health precautions provided for by the installation internal safety plan and with the skilled and authorized physician staff.

5.0 UNPACKING MOVEMENT AND TRANSPORT

When the pump arrives to the installation where it is destined, it is always suitable to verify the right correspondence between the transport papers and the goods really received.

During the pump disassembly operations, it is necessary to follow these information:

- check on the packing the lack of damages due to the transport
- remove with care the pump packing
- check that on the che pump and on the equipment provided with it there is a lack of visible damages.

If there are damages on the pump and on the euiipmentent provided with it, keep in touch immediately with Pumps CerPELLI to verify the pump function.

So, provide immediately to the packing elements waste disposal which can be dangerous, (such as rivets, splinters ecc,) and to the materials checked and differentiated waste disposal (such as plastic, carton, polystyrene).

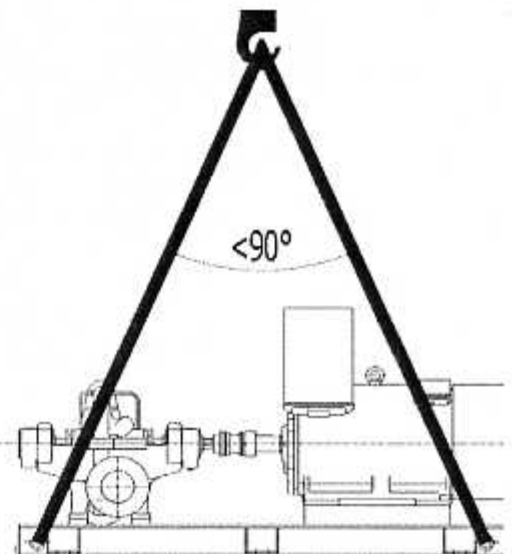
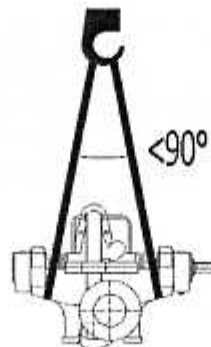


Before the pump transport, which has been already disassembled on the arranged installation base, check the technical papers furnished where there are the following data:

- total weight
- centre of gravity
- overall dimensions
- the points position arranged for the group lifting.

So, transport **ALWAYS** the pump (or the group pump-base-engine) in horizontal position on the arranged installation base.

Avoid always that the ropes do not damage the pump or the engine.





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The pump transport has to be effected by skilled and experienced staff, informed about the risks connected to the movement operations following the current laws.
 Make sure that the lifting and transport means discharge is suited to the engine weight.
 Verify that the course to follow before the movement is free from obstacles and that dimensions are suitable for the group passage.
 Verify the load solidity
 Avoid the the ropes or the slings used for the group lifting form a triangle with the vertex angle more than 90°.
 DO NEVER USE the eyebolts arranged on every engine.

IT IS FORBIDDEN every pump movement or some parts of its different from what above described

5.1 The pump storage and preservation.

For all Pumps CerPELLI products, a preservation treatment is arranged in accordance with the peculiar customer demands (about 3/6 months), but if it is demanded more storage time, it is suitable to follow these information, preserving, if possible, the original pump and its fittings packing.

- Replace the pump in a closed, cleaned, dry place that is not exposed to solar rays and vibrationfree.
- Avoid that the temperature goes down below 5°C (in this case it is necessary to drane entirely the pump from every kind of liquid that is not antifreeze).
- Close every hole and/or communicating opening with the interior pump .
- Fill up entirely the pump with the suitable anti-corrosive product, compatible with the packing set up on the pump and then rotate the shaft pump for some turnings, impregnating the whole inner surface.
- Protect the worked area with rust preventer products.
- Cover the pump with an impermeable sheet.
- Fill up entirely the bearing boxes and the gear boxes with lubricant oil.
- Rotate the pump shaft, at least, every 3 months, and then let do some turnings to the pump.
- Periodically, check the liquid level in the pump and in the mountings.

If there is some rotary part shut-down, it is necessary to disassemble entirely the pump and then to substitute the damaged parts.

List of some products suitable for long preservation

ESSO	Rust-Ban 337
MOBIL	Mobilarma 247
CASTROL	Castrol Rustilio DW
SHELL	Shell Ensis fluids
IP	IP Idex fluid PM gr.II
VALVOLINE	Tectyl 511 M

Note: verify the use instructions of the suggested products through the producer cards

5.2 Starting after a long storage time.

Before starting the pump, it must entirely removed the anti-corrosive protection from the pump, using a solvent compatible both with the anti-corrosive product used with the pump constructive materials and, particularly, with the service to which the pump is destined.

Before starting the pump, verify the packing state such is O-ring, V-ring, checking their elasticity and, if that is the case, substituting them with new packings



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6.0 INSTALLATION

The pump installation in site is a very important operation and it has to be carefully attended because the good working depend on it.

Proceed to the group installation only after all the regulations imposed by the local Institution have been verified (for example safety, pollution laws ecc.).

Do not remove the cover protection which are set up on the delivery and aspiration flanges or the closing caps belonging to possible connections before keeping in touch with the pipes, all this in order to protect the pump inside from the foreign bodies entry.



Before starting the delivery and aspiration pipes connection, it is always necessary to certify that these one are perfectly cleaned and then without slags, such as welding rests, sand, foreign bodies, ecc.

Protect always the pump through the filter, also sized on the grounds of the fluid viscosity to pump up, p... aspiration. The load loss of the filter should not reduce to intolerable limits the aspiration pressure which has always to stay within the provided for limits on the confirmation or on the specific technic of the pump.

If the pump is destined to the fluid pumping with a temperature more than 80°C some parts of it can be find during the working with the temperature higher than the threshold scald. In this case it is always suitable to foresee the right protective means, such as defining barriers or other.

The location has to be carefully done on the foundations trying to avoid crushes and using the right means for the lifting.

Set up the pump group in a place accessible from each side, cleaned and able to support a right and a viable installation foreseeing a 1500 mm area around the pump.

Guarantee a right group ventilation avoiding the location in narrow, dusty and hardly ventilated places

6.1 Foundations

The foundations must be projected and realized to take over both the group engine-pump vibrations, and sustain the pump weight, the auxiliary machines, the engine and the metallic base so as to forestall vibrations and bad alignments during the working, making sure a stern mounting inside the same group.

If the foundations are realized in weld steel, it is always necessary to foresee 6 or more contact points between common base pump and engine and the same foundation.

The foundations bolts should be settled as showed on the constructive and installation drawing.

Await that every preparation work necessary for the group starting, such as the wall work, finishes before going on with the installation.

6.2 Driver installation.

If the pump is supplied bare shaft, it is necessary to install a pump with a driver on appropriate baseplate.

If the furnished pump is not connected to an electric engine, but it has a base, it is necessary to do the connection with a right driver and a right coupling before going on with the installation.

Besides, install a coupling guard in according to the requests demanded by the safety laws (such as EN294 o DIN 24295).

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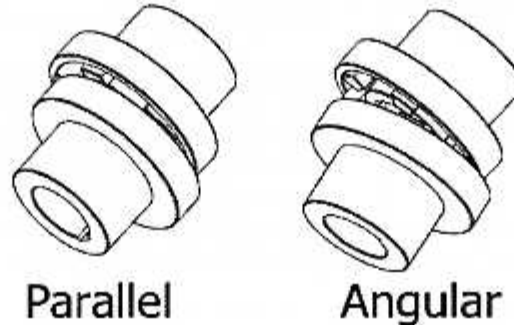
6.3 Alignment

If the pump include coupling and driver, the whole group has been carefully aligned at the firm before the consignment.

The group alignment is critical for the good working of it.

Noises, shaft bending, vibrations, overwear or the connection joint breaking, compass bearing, wear rings, packing or meccanic seal, engine seizing-up, can be the result of a faulty alignment.

Misalignments



Besides, the temperature can remarkably influence the group alignment and the pump and the engine expansion must be considered during the alignment.

If the temperature is high it is necessary to verify the alignment in all pump operation mode, at cold and hot conditions or counteract the shaft and the joint expansion increasing the distance among the same semi-joints.

Check always the alignment before the pump starting, to verify a possible changes due to casual reasons happened during the transport and the starting.

Check always the stopped pump after having made active the safety procedures to avoid the casual starting.

During the alignment operations it is always necessary to use protection for hands, such as gloves.

Execute the intervention at least with two persons.

For every operation use always the right engine such as tackles or other.





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6.3.1 Alignment procedure

Stop the pump and remove the protection to the coupling.

Take away the protective varnish from the coupling and clean it carefully.

Disconnect the flexible elements of the coupling.

Check the bad alignment both angular and parallel.

Correct the driver position (or the pump position) including some depths or settling their position.

Repeat the control operation concerning the alignment until the noticed measures are part of the tolerances foreseen by the constructor. (See coupling tolerance table)

Block firmly the fastening bolts of the pump at the base.

Set out, bore and cut screws the engine plate bearing for the fastening bolts.

Tighten the engine fastening bolts and secure it firmly to the base.

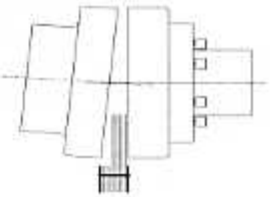
Check again the alignment and execute the final regulations according to the necessities.

Reassemble the joint protection

Check angular alignment:

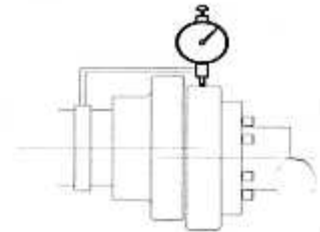
Fit in a shim between the faces of the two semi-joints and check the distance between them.

Repeat the operation at least in other 4 point, making manually rotate a semi-joint



Check parallel alignment:

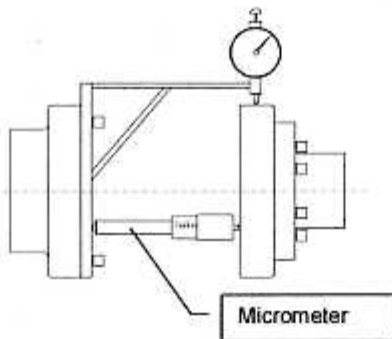
Fasten rigidly the comparator on the semi-joint pump side with a flask, in order to assure the comparator measure accuracy. Check the alignment putting the comparator lever on the other semi-joint, rotating a semi-joint and checking the measure quoted on the comparator.



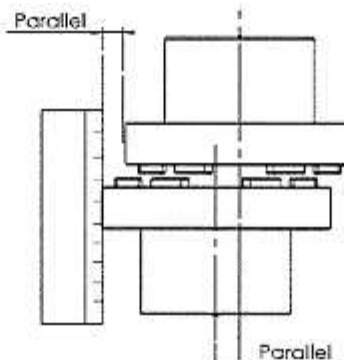
WARNING

Connect two semi-joints through elastic elements or the spacer only after having fastened the suction/discharge pipes and having checked that the pump freely turns acting manually on the pump shaft.

Particular cases:



If the coupling have a spacer, check the parallel alignment, using an inner micrometer



If a sensible lever indicator is not available or the joint is too little, it is possible to execute the parallel alignment using a rule.



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6.4 Pipes

The rated diameter of the suction and delivery pipings not necessarily have to correspond to the pump flanges. But this diameter does not have to be smaller than the rated diameter of the suction/delivery pump.

Generally the fluid speed in the pipings has to be about of 2m/s, for the suction pipings and about 3m/s for the delivery.

With higher speed there will be higher pressure losses that could cause the cavitation arise, pressure overfall; in this way, the pump good working is compromised.

If the pump has to work with low values NPSHA (Net Pressure Suction Head Available) or in depression, the aspiration pipings and the whole aspiration system must be well sized and studied. It is unimaginable that the pump can pass the system project lacks, such as the long piping and aspiration ways, maybe subdimensioned and containing many curves, valves and first of all the aspiration piping has not to have bags or high points where the gas can tin.

Besides, this kind of machine, for its own peculiar working characteristics, has internal very strict games, and then every remaining or slag can cause serious damages to the pump. Examine carefully the pipings to assure that there is want of foreign bodies or incrostations and cleaning with care before connecting the pipings.

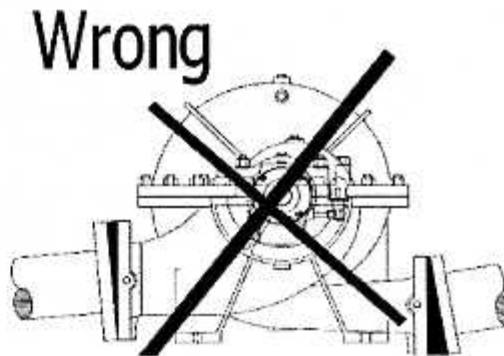
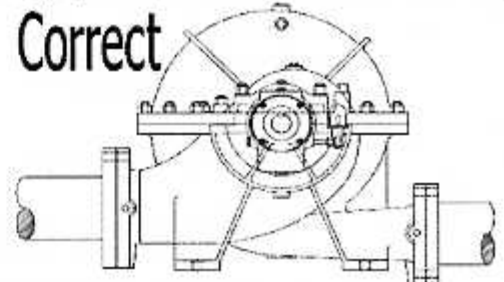
Avoid, where it is possible, the curves use and in particular the ones with narrow spoke, and connect different diametres pipings with reduction to tapered invitation and the eccentric type, and if possible with a connection way long about 10 times the diametre differences.

All the pipings must be set on their own mounting, independent from the pump, in order to substain its own weight, the accessories weight with the isolation, the transported fluid weight and all the forces and the winged moments due to the thermic expansions.

It is necessary to take every clever device not to discharge on the aspiration and the delivery flange of the pump forces and moments that can compromise the alignment and then prime vibrations, components and damages overwear.

Possible thermic shock and/or overvibrations should have to be prevented using, for example, some expansion joints.

The coupling between the different piping has to be executed through flanges interposing a dimension garnish and the suitable material, verifying that these are well centred between the tightening bolts so they do not provoke flux resistences or remaining tensions.



WARNING	<p>After having blocked the pump to the base and after having connected all the pipings to the pump, check the shaft rotation acting on the coupling semi-joint without elastic elements, the pump must have the possibility to freely rotate. The mechanics resistance to win is due more to the friction between the faces in contact of the mechanics seal.</p> <p>Check again the alignment after having blocked the pipings to the pump before connecting the joint to the engine</p>
----------------	---

A right aspiration and delivery piping connection is necessary to avoid the bad alignment and the following bearing overheating and the overwear of the rotary parts.

The faces of the pump and the pipings flanges must be parallel and to couple without compulsions. Do not use levers to force the bolt holes alignment.

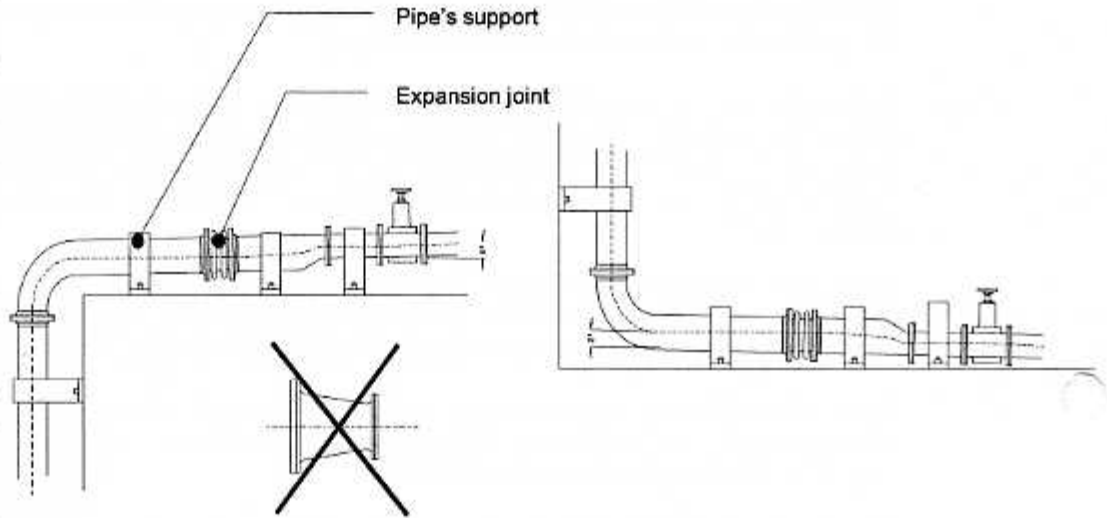
If the pipings are connected to the pump, do not weld them.

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6.4.1 Suction pipe

Install the suction pipes in order to avoid some air bags, that can cause vibrations and bad pump working. This piping should have to have a rising movement in case of low aspiration or descending in case of aspiration from a tank set on the pump. The possible valve set on the aspiration pump has to be used only with interception function and NOT the regulation one.

Install, where it is necessary, a bottom valve to prevent the aspiration collector emptying during the stop. If there is more pumps installation, every pump must have its own suction pipes connected to the main collector.



6.4.2 Discharge pipe

Immediately after the pump delivery flange, it is necessary to install a not return valve to prevent that, during the driver stop, the liquid column, reflowing toward to the tank, makes rotate the rotary axes in an opposed direction causing the shaft breaking if there are frequent starting.

Besides install a safety valve and an interception valve.

Safety valves or pressure limiter valves have to be mounted between the delivery flange pump to protect both the pump and the piping system, as in case of closing or casual restriction of a valve set in the discharge piping can rapidly increase the piping pressure.

The safety valve of the piping must be endowed of a right discharge collector connected with the feeding source in order to avoid a fluid overheating pumped due to a recycle.

The volumetrical two-screws pumps, usually, are furnished of a safety valve in order to protect the pump body by dangerous inner overpressure.

If it is necessary a pump delivery regulation do not act on the interception valve set on the pump delivery seal, as the installed pump is the volumetrical kind and then closing the seal valve it is created an inner overpressure that can provoke some breaking to the same pipings.

In case of a lifting regulation, it is necessary to foresee or a suitable external recycle or a variable turning engine.

6.4.3 Auxliares pipes.

The auxiliary piping can include those for breather, drainage, seal flange washing, seal circulation oil, seal fluxing, bearing mounting cooling, ecc..

If the pipings are furnished by Pumps CerPELLI, look the enclosed installation drawing. When the auxiliary pipings have to be installed to the Customer, dimensions and all connection positions will be showed on the installation drawing.



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6.5 Electrical connections

The electrical connections must be done only by skilled staff which should have to follow the engine constructor instructions, the electrical machines and the provided current regulations.
Verify the constructor specifications contained in the instruction journal enclosed to this handbook or furnished with the engine.



**FOLLOW THE SAFETY SPECIFICATIONS LISTED IN CHAPTER 2.1
EVERY ACTION MUST BE ALWAYS EXECUTED WITHOUT ELECTRICAL VOLTAGE**

It is recommended to protect the engine against the overweight with suitable switches and/or fuse-wires. Choose their protection degree verifying the full load current stamped on the engine plate.
Besides, it is suggested to install an emergency pushbutton.

Do the right electrical connections without neglecting the engine grounding.

Before doing the electrical connections, verify that pump and engine turn freely by hand.

Verify that the engine rotation direction agrees with the pump rotation direction stamped on it, if possible, before it is connected to the pump.

Foresee the suitable protection means in case of the rotation test of the engine got away from the pump in order to avoid possible incidents.

The opposite and/or dry rotation can cause serious damages to the pump.



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7.0 PREPARING THE FIRST STARTING

Before going on with the starting operations verify that piping and pump are filled up with the fluid to pump and entirely escaped from possible air bags.

Verify that all the auxiliary services are available and ready to use and where it is necessary, properly started (such as, for example, the mechanicals seals fluxing)

Check that the pump and the engine bearings and the gear boxes are properly lubricated and the levels reflect the ones ordered.

Possible refilling must be done through the suitable connections and using the suitable lubricants.

If the pumped liquid temperature represents a danger, it is necessary to protect both the pump and the pipings from the contact possibility, besides, it is necessary to avoid thermic shocks to the pump with suitable clever devices (such as insulation, pump body gradual preheat, ecc.)

WARNING the pump must never work dry



During the first starting operations, it is necessary to be particularly careful in avoiding the contact and/or the inhalation of the possible pumped liquid.

Check that the engine rotation agrees with the pump rotation direction as showed by the arrow set on the pump body.

Before starting the pump, check again the alignment and if necessary correct again as showed by the section "Alignment" verifying that it turns freely by hand.

7.1 Priming

The pump must be completely filled with liquid before starting. If the pump is above the level of the liquid to be pumped, close the discharge valve. If the pump is below the level of the liquid, open the discharge valve 1 1/2 to 2 turns. Prime the pump. All air and vapor must be removed.

Mechanical seal chambers must be vented and filled with liquid. This is particularly important when an external heat exchanger is used with the mechanical seal. When the priming operation has been completed and a continuous stream of liquid is flowing from the vent lines, close the vent valves.

The pump is ready for starting.



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7.2 Checks before starting

Before pump starting procedures, it is necessary to verify the following:

1	Does this handbook have been read in its totality?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
2	The whole piping system has been filtered and released by possible slags	Yes <input type="checkbox"/>	No <input type="checkbox"/>
3	Does every possible choking have been removed from pipings and pump?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4	Do all the auxiliary connections and the pump pipings have been properly installed as showed on the installation drawing/s?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
5	Are all the auxiliary connections, such as the mechanics seal fluxing, the gear box cooling, ready for the working?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6	Are all the connections and pipings without losses and there are forces and wringed moments want?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7	Are all the bolts, the piping connections and taps properly tighten?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
8	Do the pump and the engine have been properly lubricated? Are the lubricant levels right?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
9	Does the coupling pump-engine have been verified?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
10	Does the joint have been properly reassembled?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
11	Are all the piping valves in the right position?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
12	All the safety protections have been properly reassembled	Yes <input type="checkbox"/>	No <input type="checkbox"/>
13	Is the engine rotation direction right?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
14	Is the pump stop pushbutton position clear and evident?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

If there are one or more negative answers, do not start the pump but verify the point or the points till to obtain a positive answer.

7.3 The pump starting

Start the driver and bring the pump up to speed rapidly. As soon as the pump is up to full speed, open the discharge valve slowly. Do not let the pump run with the discharge valve closed. Check the pressure gauges on each side of the temporary screen in the suction line. A pressure drop across the screen indicates it is becoming clogged with dirt or scale. In this case, the pump should be shut down and the screen cleaned or replaced. A clogged screen can cause damage to the pump. The pump should be shut down if it fails to develop its rated discharge pressure at operating speed, or if bearings overheat or there is undue vibration or noise.

7.3.1 Starting Precautions For Hot Pumps

When the temperature of the liquid being pumped exceeds 180°C (350 °F) the pump must be gradually heated before starting. Any rapid change in temperature may cause thermal distortion, and the risk of misalignment of bearings and bushings internally, and of pump and driver externally. During the warm up procedure a small amount of hot liquid should be circulated through the pump. The warming up rate varies for each application and has to be individually analyzed. In general we would recommend a warming up rate of 37°C (100°F) per hour up to 260°C (500°F) and 20°C (50°F) per hour above 260°C (500°F). This heating should be continued until the casing is not more than 20°C(50°F) below the eventual pumping temperature. Obviously these warm up rates are general and cover a wide range of materials and applications. Lesser warm up rates may be possible for special jobs and can only be determined by on site testing by user. During testing, alternative warm up rates may be tried and the pump alignment checked for any distortion and the pump turned over by hand to check the freeness of the rotor. An evenly heated pump case and piping will cause no excessive misalignment and an evenly heated pump rotor will turn without undue dragging.