

FABBRICA ITALIANA POMPE



PUMPS

SERIES ALFA R

INSTRUCTION MANUAL



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TABLE OF CONTENTS

1	GENERAL INFORMATION	3
1.1	TYPE OF PUMP	3
1.2	USE	3
1.3	ENCLOSURES	3
1.4	MANUFACTURER.....	3
1.5	WARNINGS.....	3
1.6	STARTING	4
1.7	DESCRIPTION	4
2	HANDLING	5
2.1	TRANSPORT	5
2.2	LIFTING	5
2.3	INTERMEDIATE STORAGE.....	5
3	INSTALLATION.....	7
3.1	MAIN INSTRUCTIONS FOR THE INSTALLATION	7
3.1.1	FORCES AND TORQUES APPLICABLE TO FLANGES.....	8
3.1.2	SPECIAL PRESCRIPTIONS	9
3.2	POSITIONING	10
3.2.1	BASE (FIG. 4)	10
3.2.2	PIPE CONNECTION.....	11
3.2.3	ALIGNMENT	11
4	OPERATION	12
4.1	1ST STARTING	12
4.2	OPERATION.....	12
4.3	STOPS AND FOLLOWING STARTS.....	13
5	NOISE LEVEL	13
6	MAINTENANCE	14
6.1	CROSS-SECTION AND LIST OF COMPONENTS	14
6.2	LUBRICATION.....	16
6.2.1	COUPLING SIDE BEARING (POS. 3011 - FIG.6)	16
6.2.2	PUMP SIDE BEARING (POS.3011.1 - FIG.6)	16
6.3	BEARING TYPES.....	17
6.4	REMOVAL FROM THE PLANT.....	17
6.5	DISASSEMBLY (REF. FIG. 6).....	17
6.5.1	PRELIMINARY SAFETY OPERATIONS	17
6.5.2	REMOVAL OF THE PUMPING UNIT	17
6.5.3	IMPELLER DISASSEMBLY	20
6.5.4	GLAND PACKING DISASSEMBLY	20
6.5.5	MECHANICAL SEAL DISASSEMBLY	20
6.5.6	BEARING DISASSEMBLY	20
6.6	ASSEMBLY	21
6.6.1	PUMPING UNIT ASSEMBLY	21
6.6.2	FINAL ASSEMBLY	21
7	FAILURES	22
7.1	DEFECTIVE WORKING.....	22
7.2	CAUSES AND REMEDIES	22
8	SIZE AND WEIGHT	24



1 GENERAL INFORMATION

1.1 TYPE OF PUMP

ALFA LD				
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Series 
Pump size 
Motor 

 Serial no.
Support

1.2 USE

Pumped liquid: Diathermic oil

T = °C - Density = Kg./ dm³ - Viscosity =

ATTENTION!

The performance data are written on the rating plate of the pump.

The pump must be used only for the purpose it has been supplied for.

It shall work within the set limits of performance: delivery, rotation speed, liquid type and physical conditions (temperature, pressure, density, etc.).

1.3 ENCLOSURES

The following enclosures are an integral part of this instruction manual:

1.4 MANUFACTURER

F.I.P.
FABBRICA ITALIANA POMPE S.p.A.
V.le Casiraghi, 241
20099 Sesto S. Giovanni (Milano) - ITALIA

1.5 WARNINGS

The pump must be used for the purpose it has been acquired. Every possible change in both physical and chemical characteristics of the pumped liquid must be estimated in co-operation with the manufacturer.

The pump shall not exceed the performance values (delivery, head, rotation speed, temperature, pressure, etc.) written in the documents of sale and/or on the rating plate.

This manual contains instructions for the installation, operation and maintenance of LD series pumps, mainly as regards safety, for both things and people. Nevertheless, as it is not possible to exhaustively forecast all events which might arise on the various plants, it is compulsory to entrust specialized personnel and experts with the above mentioned tasks, on both the designing and the operative level. The above mentioned personnel shall have the possibility to carefully read this instruction manual and to ask Fabbrica Italiana Pompe for any particular problem not taken into consideration in this instruction manual or for further explanations and/or supplementary information.

For such contacts, it is absolutely necessary to indicate the serial number of the pump in question.

The most dangerous situations due to the non-observance of some prescriptions are pointed out with different symbols placed at the margin of the text:



General danger for people



Danger of electric origin for people or things

ATTENTION!

Danger regarding the integrity of machinery and things in general.

1.6 STARTING

Three-phase electric motor - Type B3

The data relating to power supply and operation are written on the rating plate of the motor.

The centrifugal pumps can be started up with different kinds of motors, whose choice depends on the use foreseen for the unit.

However, considering the large use of directly coupled electric motors, in the present instruction manual the pump is considered provided with electric motor and information and warnings refer to the unit formed by the pump and the electric motor.

ATTENTION!

Therefore, be aware that any information referring to the motor in the present manual is general. It is absolutely necessary that the user is informed about the characteristics and warnings concerning the motor operation and safety, by carefully consulting the relevant instruction manual.

1.7 DESCRIPTION

Single-stage centrifugal pumps suitable for the transfer of liquids having lubricating properties, maximum temperature 350°C.

Spiral casing with supporting feet at the base, axial suction, radial upward delivery.

The pump is the bare axis pump.

The unit is the pump complete with motor, coupling and base.

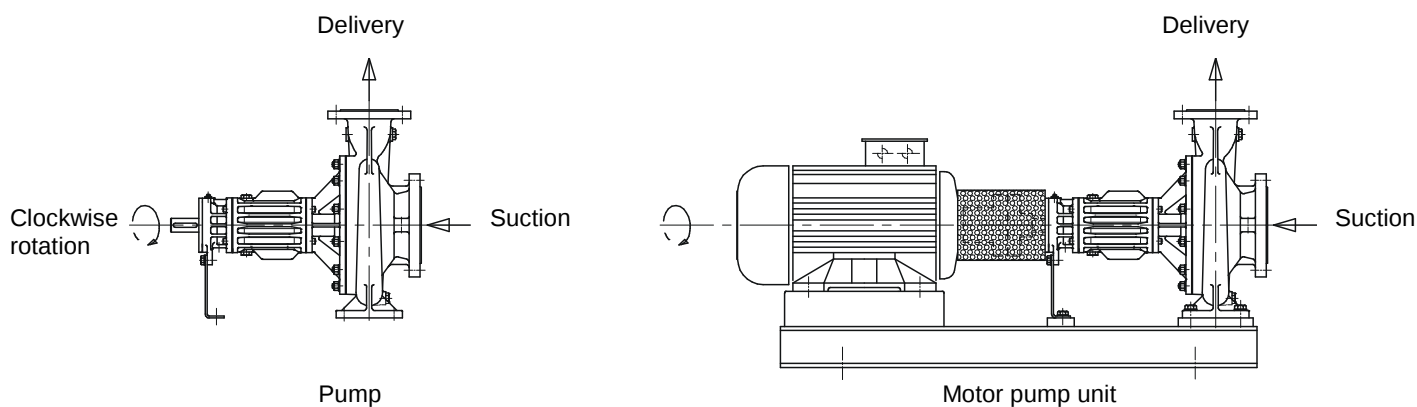


fig. 1

2 HANDLING

2.1 TRANSPORT

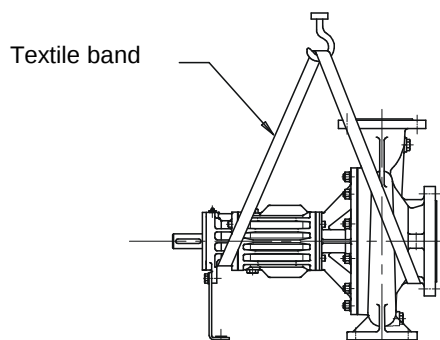
According to the shipping conditions, the transport can be:

- a) without packing
- b) on pallet
- c) in a wooden crate
- d) in a wooden case

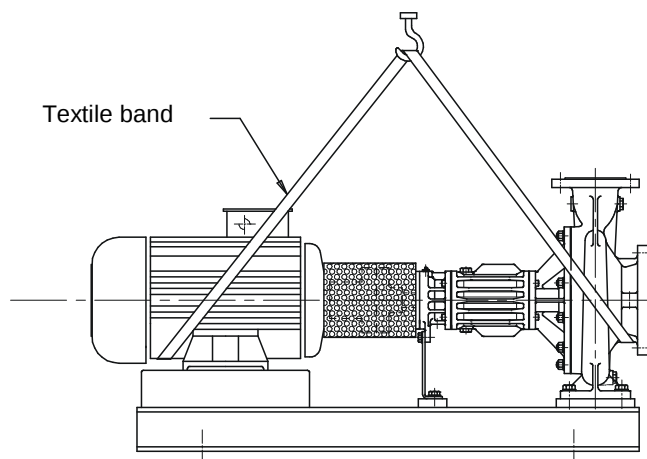
In cases a), b) and c) the pumps cannot be put one on top of the other.

During transport, the pump or unit shall be kept in horizontal position.

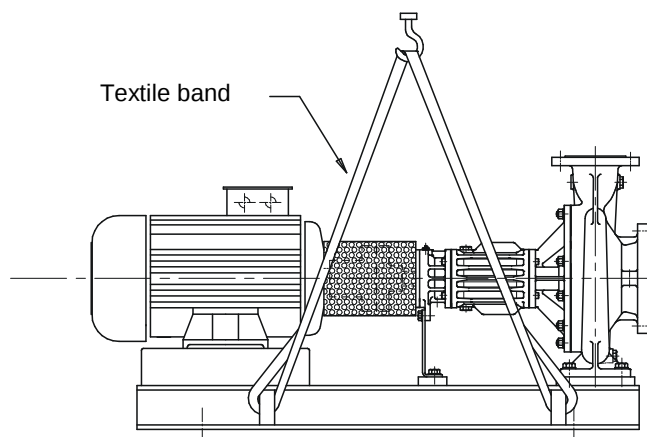
2.2 LIFTING



Bare shaft pump



Motor pump unit with motor size < 180



Motor pump unit with motor size ≥ 180

fig. 2

2.3 INTERMEDIATE STORAGE

- a) In a closed and dry place.
- b) Minimum storage temperature: -25°C
- c) Maximum storage time under standard shipping conditions:
 - For pumps made of material not prone to oxidation (Stainless steel, bronze, etc.)
 - For pumps made of material prone to oxidation (Cast iron, steel, etc.)

3 years

1 year



In case of longer storage time and/or environmental conditions different from a) and b), it is necessary to provide for suitable protections and packing.

3 INSTALLATION

3.1 MAIN INSTRUCTIONS FOR THE INSTALLATION

In general, the starting is carried out under short-circuited conditions for motors up to 10 kW, while for more powerful motors a starting system with progressive absorption of current is used. However, skilled technicians shall carefully evaluate the choice of electric devices and power supply features.



ATTENTION!

For big pumps and when the starting operation has to be made easier, it is possible to close the delivery gate valve at the starting.

If the unit is destined to work in potentially explosive environments, the motor and the various electrical devices must be manufactured according to the regulations in force.

Size pipes according to the flow rate and however with a diameter not smaller than the pump inlets.

Use truncated cones for changes in the diameter.

Foresee the installation of suction and delivery gate valves.

Foresee the installation of a check valve on the delivery pipe.

Foresee the installation of control and safety instruments:

ATTENTION!

- pressure-gauges for the measurement of the delivery and suction pressure
- overload cut-out to stop the motor in case of absorbed power overload.

Check that the space surrounding the pump allows to carry out maintenance works and, behind the electrical motor, provide for a distance from the wall equal to the diameter of the cooling air suction pipe (see Fig. 3).

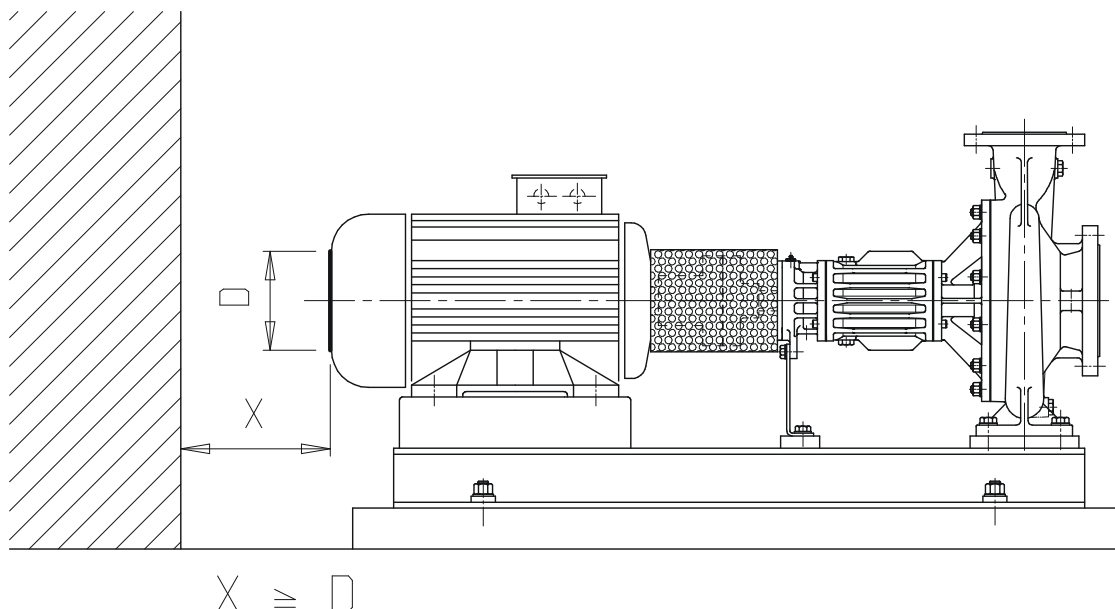


fig. 3

The suction pipe shall have the following characteristics:

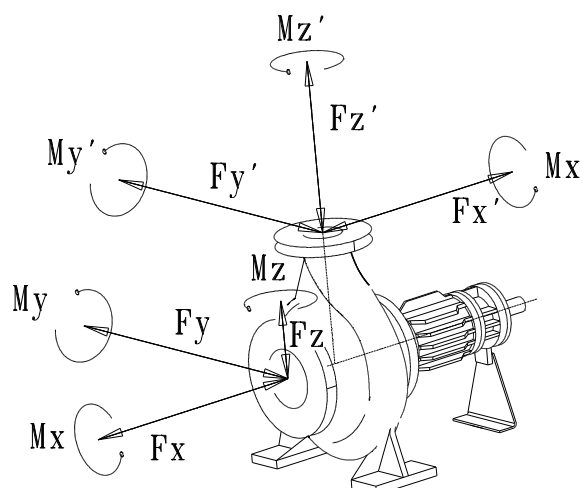
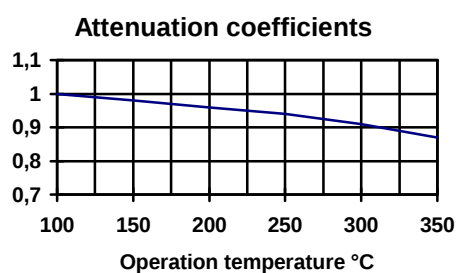
- minimum length;
- maximum diameter;
- be as straight as possible
- perfect seal to avoid air seepage.

3.1.1 Forces and torques applicable to flanges

– Nominal values for nodular cast iron constructions

NOZZLE	DN	FORCES daN				TORQUES daNm			
		F_Y^1	F_Z^1	F_X^1	ΣF^1	M_Y^1	M_Z^1	M_X^1	ΣM^1
D	32	51	64	58	112	24	36	56	80
I	40	68	85	75	132	32	44	64	88
S	50	92	112	100	176	40	52	72	100
C	65	112	144	128	220	48	56	80	112
H	80	140	172	152	268	52	64	88	124
A	100	184	228	204	356	60	76	100	144
R	125	224	276	252	428	76	92	128	188
G	150	276	340	312	532	100	124	160	228
E	150	276	340	312	532	100	124	160	228
NOZZLE	DN	F_Y	F_Z	F_X	ΣF	M_Y	M_Z	M_X	ΣM
S	50	100	92	112	176	40	52	72	100
U	65	128	112	144	220	48	56	80	112
C	80	152	140	172	268	52	64	88	124
T	100	204	184	228	356	60	76	100	144
I	125	252	224	276	428	76	92	128	188
O	150	312	276	340	532	100	124	160	228
N	200	408	368	456	712	144	172	220	320

Tab. 1



Attenuation coefficients according to the operating temperature to be applied to the values of Table 1.

3.1.2 *Special prescriptions*

The pumping of high temperature diathermic oils requires suitable protections to people, things and the environment.

In particular, foresee what follows:

ATTENTION!

- Suitable protections so that the pump casing cannot be touched by anybody. If an insulation layer is carried out, remember that it shall be used only for the pump casing since both the cover and the support shall freely loose heat in the environment. Lacking this, the good operation of the bearings as well as the mechanical seal could be endangered. Therefore, even in case of insulation of the pump casing, a suitably marked no admittance area shall be foreseen to protect the whole pump.
- Conveying and collecting ways for both leaks due to the mechanical seal wear (S3) and the drained liquid due to the pump emptying (S1) for maintenance.
- Protective devices and emergency conveying ways in order to discharge accidental big leaks due to failures, avoiding the contact of the liquids with inflammable materials and/or people and without dispersing them in the environment..

3.2 POSITIONING

3.2.1 Base (fig. 4)

The pump unit shall be installed on a concrete base provided with suitable holes for the anchor bolts.

Shims shall be placed between the metal and the concrete base, each side of the bolts; further shims shall be added, should the distance between the anchor bolts exceed 1 m..

Such shims ($S=3\div 10\text{mm}$) shall be suitably sized to lay the unit flat, a condition which can be checked using a water level.

Fill the holes with mortar, wait until it sets and tighten the nuts.

Fill the inner spaces of the metal base with no-contraction concrete.

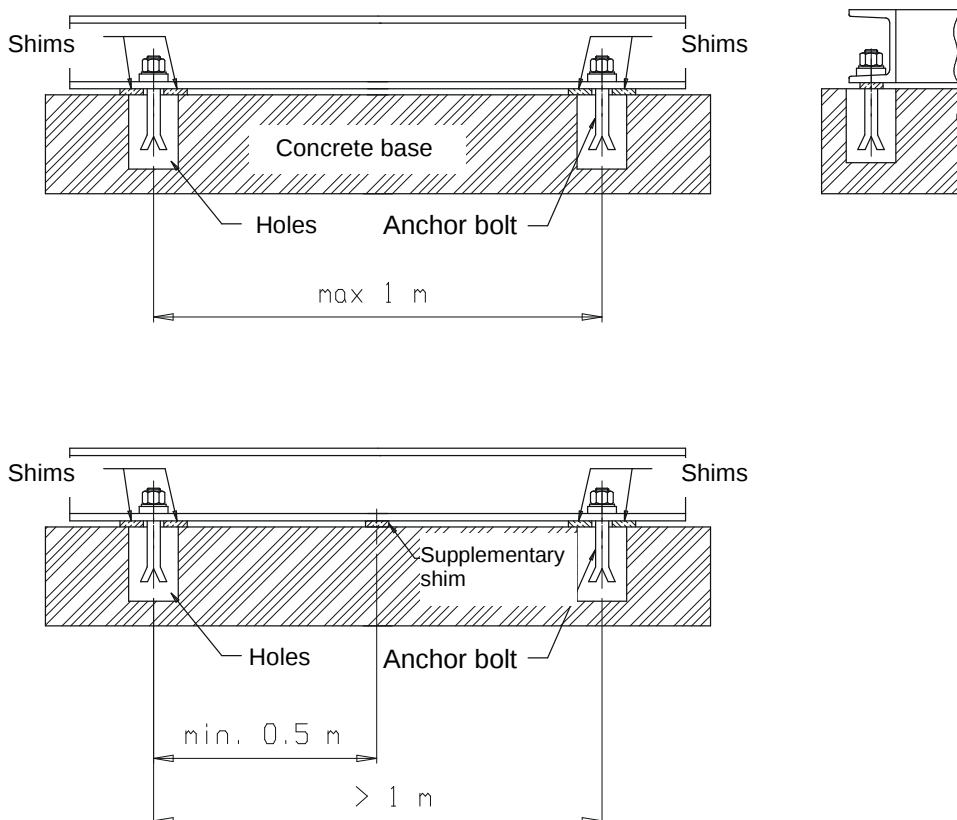


fig. 4

The positioning of the motor pump unit according to the above described indications allows to obtain good operating conditions mainly as regards vibrations, noise, alignment.

Should the motor pump unit be installed differently, for instance on metal structures, the disadvantage compared to the above positioning shall be limited by stiffening the supporting structure mainly near the pump-motor unit.

3.2.2 Pipe connection

Remove the protective plugs from the pump inlet.

Stresses transmitted by the pipes to the pump flanges shall not be more than allowed; for this purpose, it is necessary that:

- Pipes don't weigh on the pump flanges, but are supplied with their own supports.
- Expansion joints duly anchored to independent structures counterbalance stresses deriving from pipe thermal expansion.
- The tightening of the flange connecting bolts is needed to compress the gasket and not to approach the flanges.
- However, the residual stresses to the flanges shall not exceed the values stated in table 1, bearing in mind the attenuation coefficients due to the pump operating temperature.

3.2.3 Alignment

The LD series pumps have highly elastic couplings that, compared to standard elastic couplings, allow for greater misalignments (whose maximum values can be required to Fabbrica Italiana Pompe). However, for the right operation of the pump, after the final tightening of the base anchor bolts and of the flange bolts, the alignment of the pump/motor half couplings shall be checked, bringing it back within the values set in table 2. Such an operation shall be carried out using suitable instruments or a reference gauge and rule. The adjustment of differences and the following alignment is obtained by positioning again the motor with lateral shifts and calibrating the shims under the feet next to the fastening screws on the base.

Before carrying out the aligning operations, loosen and tighten again the screws of the support foot 6581.6 (fig. 6).

ATTENTION!

ALIGNMENT CONTROLS

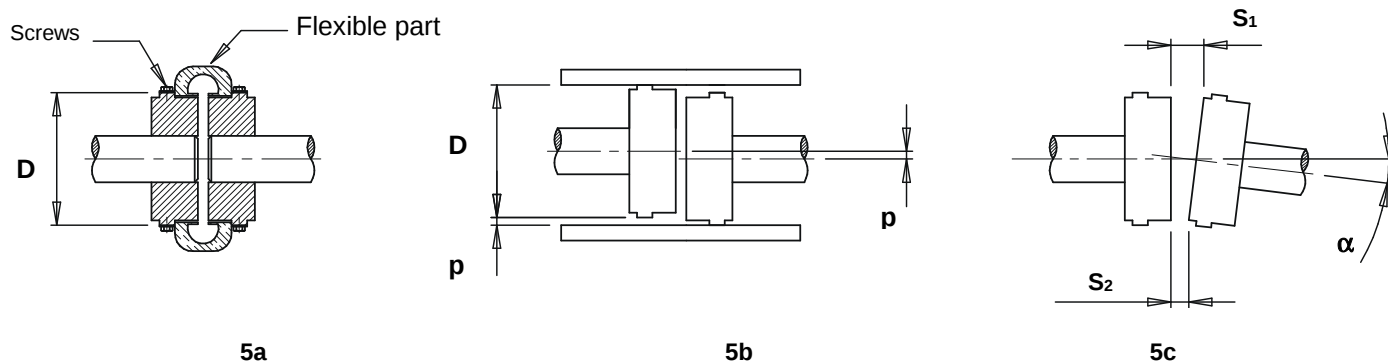


Fig.5

Ø hub	Maximum alignment values recommended upon inspection			Screw tightening
D	P	S1 - S2	α	Nm
47	0.2	0.3	22'	23
59		0.4		
66		0.4		
80		0.5		
93		0.6		
114	0.4	0.6	18'	40
138		0.7		
168		0.9		
207		1		

Tab. 2

ATTENTION!



Both the axial (fig. 5b) and angular alignment (fig. 5c) shall be checked in more than one point along the coupling circumference.

The screws fastening the flexible part to the half couplings (fig. 5a) have a thread-stopping component which exhausts its effect after the second disassembly; therefore, in case of further uses, it is necessary to restore the stopping effect by means of safety thread –stopping liquid. Screws shall be tightened according to the values stated in table 2.

4 OPERATION

4.1 1ST STARTING

ATTENTION!



- Remove the plug R1 and fill with new and clean diathermic oil like the one of the plant or similar to it.
- Retighten the plug R1.
- Remove the half coupling.
- Check that the shaft is rotating freely.
- Make sure that the pump is full with liquid (with the suction gate valve open and the delivery gate valve closed).
- Connect the power supply and control that the voltage of the motor connecting links corresponds to the line voltage.
- Connect the grounding terminal to the grounding cable of the electric power supply system.
- Start up for a few seconds and check whether the direction of rotation is clockwise (Fig.1).
- Assemble the butt strap again, start up and slowly open the delivery gate valve until the operating values are reached.
- Carefully unscrew the plug R1 without removing it completely and bleeding any residual air lock; retighten it as soon as the oil appears on the surface.
- Check that the motor current absorption is within the set limits; should this value exceed the one shown on the motor rating plate, bring it back within the set limits by tightening the delivery gate valve..

4.2 OPERATION

ATTENTION!

Make sure that the pump always operates with liquid and with the suction gate valve completely open.

The delivery gate valve shall never be completely closed; it shall always allow for a minimum flow rate equal to 20% of the nominal one.

The operation with completely closed delivery gate valve is allowed just for short periods according to the following limits.

Pump size	..-20	..-26
Maximum operating time with closed inlet	180"	

Multiply the given values by the factor K, obtained as follows:

K1	Cast-iron impeller	1
	Stainless steel impeller	0.4
K2	Liquid temperature ≤ 200°C	1
	Liquid temperature > 200°C	0.7
K3	RPM ≤ 1800	1
	RPM > 1800	0.6

$$K = K1 \times K2 \times K3$$

ATTENTION!

Adjustments are carried out through the delivery gate valve, keeping the head under control by means of the pressure gauges and making sure not to exceed the value stated on the rating plate relevant to the absorbed power.

As for the evaluation of the operating head follow the instructions here below:

- Measure the pressure difference in bar between the delivery and suction inlets.

- Divide such a value by 0.981 and by the specific weight of the liquid (kg/dm³) at the operating temperature.
- In this way the value of the head expressed in meters is obtained, which can be compared to the value stated on the pump rating plate and sales documents.

The pump shall work without excessive vibrations. In case of said vibrations, check the alignment of the coupling and the wear of its elastic components. If after this control vibrations do not disappear, check the inner parts of the pump (bearings, shaft and impellers).

ATTENTION!

Spare pumps shall be started up at least once every month, even only for a few minutes.

4.3 STOPS AND FOLLOWING STARTS

If the unit is not provided with a device against water hammering or with a check valve, close the delivery gate valve before stopping the pump.

ATTENTION!

Make sure that the pump is empty if it is supposed to stand still at low temperatures, which could freeze the liquid contained in it.

Make sure that the pump is filled with liquid at the starting.

The frequency of starting depends on the type of pump and the operating conditions.

For standard motor pumps, working with liquid whose Specific Weight doesn't exceed 1, the maximum number of starts per hour is shown in the following table

Pump size	..-20..-26
Max. starts / h	
Up to 1800 rev./1'	12
Up to 3600 rev./1'	8

Should the new starting occur after a long stop or maintenance works, check that the conditions described in paragraph 4.1 are met.

5 NOISE LEVEL

The noise levels mentioned in the table here below, according to the Machinery Directive EN 292/2, refer to motor pump units similar to the one supplied, equipped with standard electric motors and operating at their best efficiency.

Changes in the manufacturing features of the motor as well as in the operating and installation conditions may cause changes in the values accordingly.

The noise level of the supplied single unit is given by a test, which shall be required when placing the order. The results are shown on a specific sound-level sheet.

Motor	2 poles - 3.000 rev./1 ¹			4 poles - 1.500 rev./1 ¹	
	Kw	Lp dB(A)	Lw dB(A)	Kw	Lp dB(A)
71					
80	0.75 - 1.1	70		0.55 - 0.75	68
90	1.5 - 2.2	72		1.1 - 1.5	68
100	3	76		2.2 - 3	70
112	4	78		4	72
132	5.5 - 7.5	80		5.5 - 7.5	74
160	11 - 15 - 18.5	82		11 - 15	75
180	22	84		18.5 - 22	77
200	30 - 37	86	98	30	79
225	45	88	100	37 - 45	81
250	55	89	101	55	82
280	75 - 90	90	102	75 - 90	84
315	110 - 132	92	104		
315	160 - 200	94	106		

6 MAINTENANCE

Maintenance has to be carried out by specialized personnel with suitable basic knowledge who shall be fully aware of the pump functioning having read carefully this instruction manual in all its parts.

To guarantee correct maintenance only original spare parts shall be used.

6.1 CROSS-SECTION AND LIST OF COMPONENTS

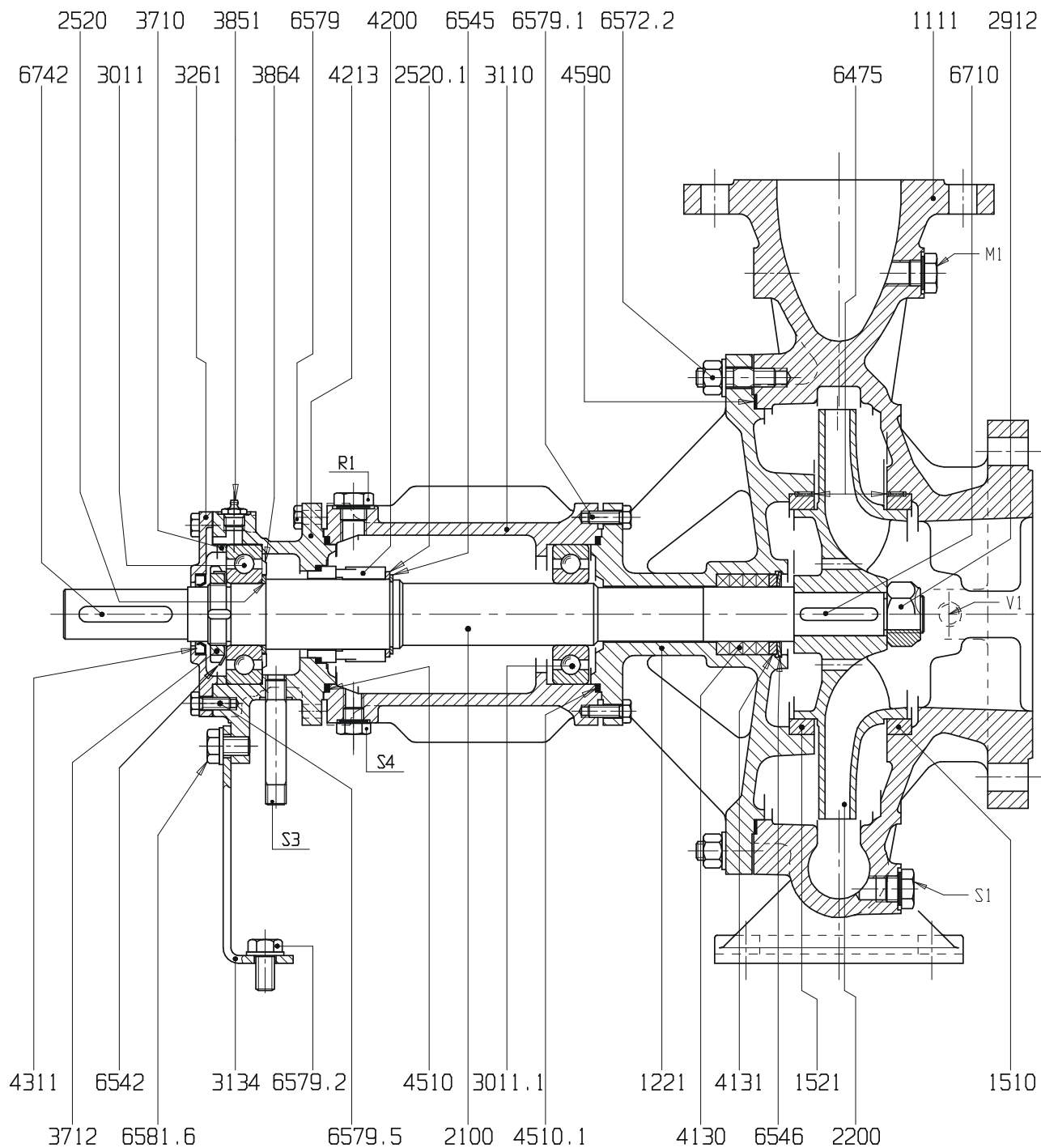


fig. 6

<u>POS.</u>	<u>QTY</u>	<u>DESCRIPTION</u>	<u>POS.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1111	1	Pump casing	4131	1	Follower
1221	1	Cover	4200	1	Mechanical seal
1510	1	Wear ring – suction side	4213	1	Support housing
1521	1	Wear ring in casing cover	4311	1	Radial seal ring
2100	1	Shaft	4510	1	Joint
2200	1	Impeller	4510.1	1	Joint
2520	1	Shoulder ring	4590	1	Joint
2520.1	1	Shoulder ring	6475	1+1	Dowel
2912	1	Impeller nut	6542	1	Lock washer for bearing nut
3011	1	Ball bearing – drive side	6545	1	Clip for shaft
3011.1	1	Ball bearing – pump side	6546	1	Compensation ring
3110	1	Support	6572.2	#	Stud bold + washer + nut
3134	1	Support foot	6579	4	Screw T.E.
3261	1	Bearing cover – drive side	6579.1	4	Screw T.E.
3710	1	Spacer ring	6579.2	2	Screw T.E.
3712	1	Bearing nut	6579.5	4	Screw T.E.
3851	1	Grease cup	6581.6	1	Screw T.E. + washer
3864	1	Grease catcher	6710	1	Key for impeller
4130	1	Gland packing	6742	1	Key for coupling
S1		Drain plug	#		Variable quantity
S3		Packing drain connection			
S4		Oil drain plug			
M1		Pressure gauge connection			
R1		Oil filling			
V1		Vacuum gauge connection			

6.2 LUBRICATION

6.2.1 Coupling side bearing (pos. 3011 - fig.6)

This bearing is greased. It is supplied with a sufficient quantity of grease until the first lubrication interval.

Types of grease

Technical characteristics (general)	TYPE		
	VANGUARD	MOBIL	SHELL
- complex soap - dropping point $\geq 250^{\circ}\text{C}$	LIPLEX EP 2	MOBILPLEX 47	LIPLEX GR.2

At the intervals stated in the table, carry out the greasing by pumping grease through the grease cup (pos. 3851).

Intervals of lubrication

Pump support type	Operation time <1800 RPM 1800 ÷ 3600		Quantity of grease per bearing gr.
			Coupling side
1	3000	2000	10
2	2800	1800	15

6.2.2 Pump side bearing (pos.3011.1 - fig.6)

This bearing is lubricated with clean diathermic oil similar to the pumped one, which shall be poured into the support casing at the first starting (ref. 4.1) and replaced at regular intervals, following the instructions here below:

- Stop the pump.
- Close the suction and delivery gate valves.
- Wait until the temperature of the pump allows handling it.
- Provide for a receptacle with sufficient capacity to put under the plug S4.
- Remove the plug R1.
- Remove the plug S4 and empty the support.
- Retighten the plug S4.
- Refill new and clean oil through R1 and screw again the plug.

Oil refilling intervals:

Supporto pompa tipo	Ore di funzionamento giri/1'		Quantità olio lt.
	<1800	1800 ÷ 3600	
1	8700	5000	0.4
2	8500	4800	0.85

6.3 BEARING TYPES

Sup.	Coupling side	Pump side
1	Ball bearing 6306 C4 (30x72x19) Ref. fig. 6 pos. 3011	Ball bearing 6306 C4 (30x72x19) Ref. fig. 6 pos. 3011.1
2	Ball bearing 6308 C4 (40x90x23) Ref. fig. 6 pos. 3011	Ball bearing 6308 C4 (40x90x23) Ref. fig. 6 pos. 3011.1

6.4 REMOVAL FROM THE PLANT

ATTENTION!

The pumps removed from the plant after a period of operation shall be completely emptied from any kind of liquid: pumped liquid, lubricants etc. which shall be disposed of according to the regulations in force.

The replaced pump or components shall also be disposed of according to the regulations in force. If the pump is stored for further uses or has to be repaired, the internal parts that have been in contact with the liquid shall be carefully cleaned. They shall be decontaminated if the pump operated with harmful or toxic liquids.

The company F.I.P. reserves the right to accept and repair only pumps handled according to the above instructions.

6.5 DISASSEMBLY (REF. FIG. 6)

6.5.1 Preliminary safety operations

ATTENTION!

Before starting to disassemble, make sure that the pump is in safety conditions. In particular, carry out the following operations:

- Stop the pump.
- Close the suction and delivery gate valves.
- Disconnect the electric power supply cable of the motor, so that it cannot be started by mistake. In case of maintenance, the electric connection is the last operation to be carried out.
- Wait until the temperature of the pump casing allows handling it.
- Empty the pump from the plug S1 and the support from the plugs S4, taking care of collecting the oil.

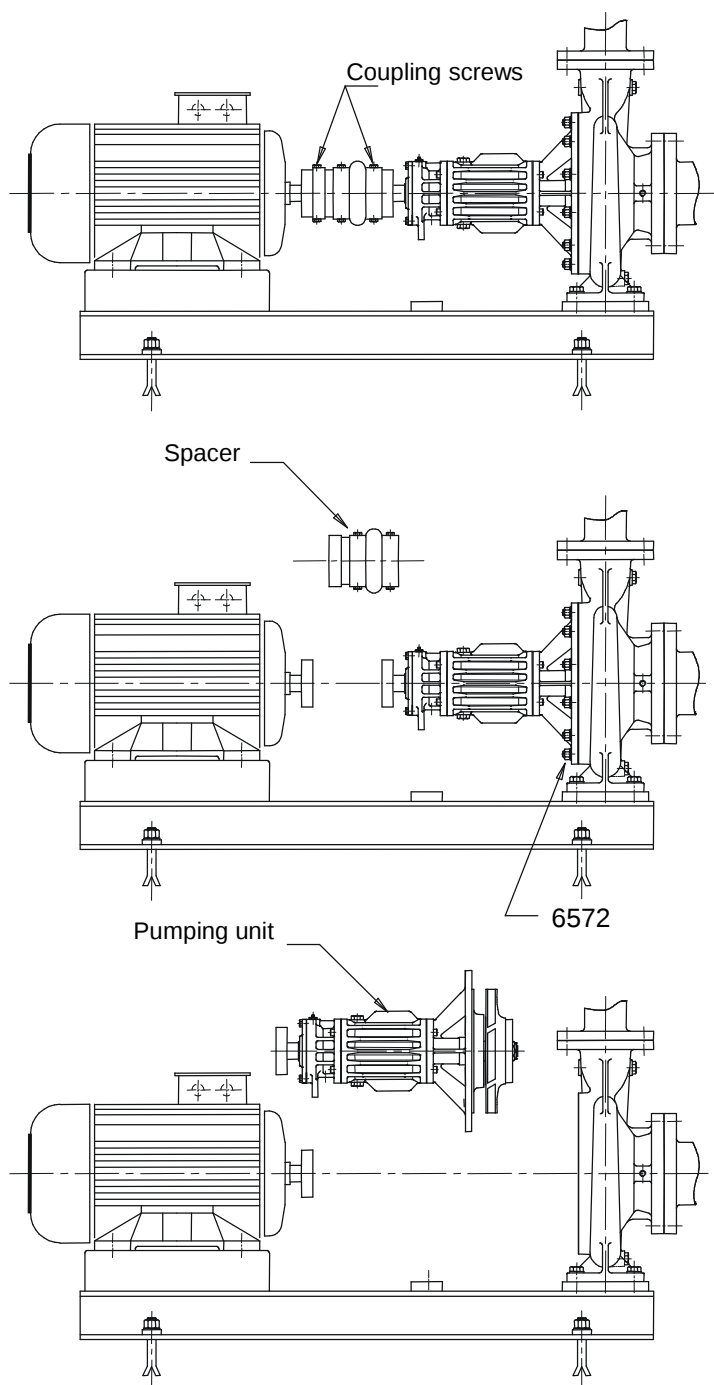
ATTENTION!

The drained oil shall be recycled or disposed of according to the regulations in force.

6.5.2 Removal of the pumping unit

- Carry out the operations described under paragraph 6.5.1
- Remove the butt strap.
- Remove the support foot pos. 3134.
- Take the pumping unit out according to the indications stated in the paragraphs here below:
6.5.2.1 for couplings with spacer
6.5.2.2 for couplings without spacer

6.5.2.1 Pump units with coupling and spacer.

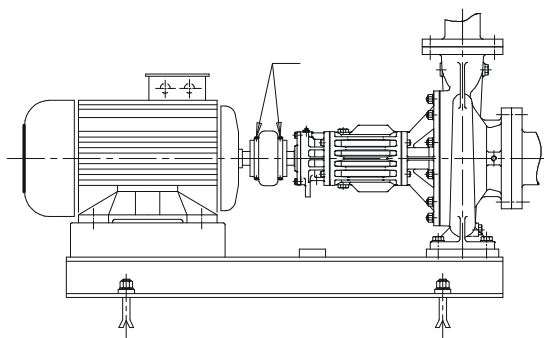


Remove the spacer

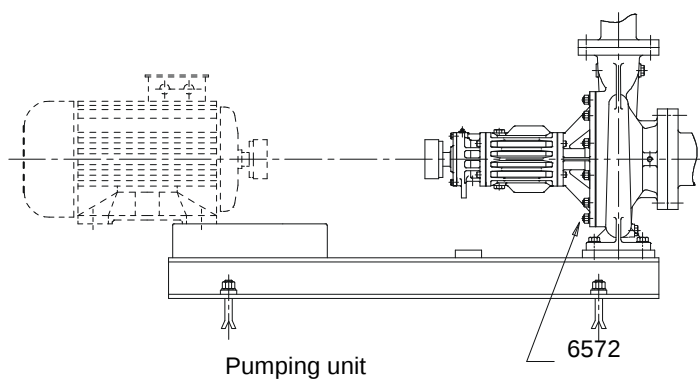
Remove the nuts 6572
Extract the pumping unit

The operation has to be carried out without moving neither the pump casing nor the motor; therefore when reassembling it is not necessary to check the half coupling alignment. When reassembling the coupling keep in mind the note concerning the safety blocking of screws (see 3.2.3 last paragraph).

6.5.2.2 Pump units without spacer

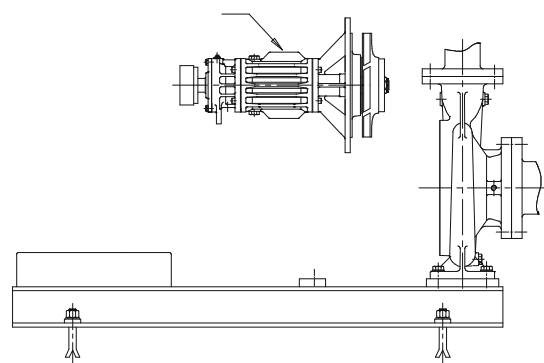


Remove the coupling screws



Move the motor backward

Remove the screws 6572



Extract the pumping unit

After reassembling the pumping unit and motor, before definitely securing the motor to the base, it is necessary to align the two pump/motor half couplings as described under paragraph 3.2.3.

6.5.3 *Impeller disassembly*

After carrying out the operations described under paragraphs 6.5.1 and 6.5.2, unloose the impeller nut 2912 (right-hand thread) and remove the impeller from the shaft.

6.5.4 *Gland packing disassembly*

After carrying out the operations under paragraph 6.5.3 remove the seeger ring 6546 and the ring 4131.

Extract the followers.

Clean the housing and the shaft carefully and check that the sliding surface of the shaft is undamaged before remounting the new gland packing.

6.5.5 *Mechanical seal disassembly*

After carrying out the above-described operations, unloose the screws 6579.1 and disassemble the cover 1221; unloose the screws 6579 and extract the support 3110 together with the bearing 3011.1

Remove the clip for shaft 6545 and the shoulder ring 2520.1 to disassemble the mechanical seal from the shaft.

6.5.6 *Bearing disassembly*

Pump-side bearing: after disassembling the support as described under the preceding paragraph 6.5.5 remove the bearing 3011.1 from it.

Coupling-side bearing: after disassembling the support and mechanical seal as described under the preceding paragraph 6.5.5, take off the screws 6579.5 and the cover 3261, thus allowing the disassembly of the housing 4213. Then unloose the nut 3712 and remove the bearing 3011 from the shaft.

6.6 ASSEMBLY

The components not showing damages may be reassembled only after carefully cleaning and examining them. In particular, it is necessary to check:

- impeller collars
- ball bearings
- surface of the shaft near the gland packing and the mechanical seal
- mechanical seal
- coupling flexible part.

ATTENTION!

The joints pos. 4510, 4510.1, 4590 shall be replaced in any case.
The ball bearings shall be the type C4 with increased end floats.

6.6.1 Pumping unit assembly

After placing the grease catcher 3864 and filling with suitable grease (ref. 6.2.1) about half of the spaces between the balls, mount the bearing 3011 on the shaft, together with the shoulder ring 2520, the nut 3712 and the relevant lock washer 6542.

- Fit the shaft into the housing 4213 by carefully pushing the bearing with a suitable device resting on its external ring.
- Place the radial seal ring 4311 into its seat, fill about half of the space between bearing and housing with grease and mount the spacer ring 3710 and the cover 3261 on 4213.
- Fit the mechanical seal ring into the housing 4213.
- Insert the rotating part of the mechanical seal onto the shaft with the relevant shoulder ring 2520.1 and the clip 6545.

ATTENTION!

Pay particular attention that the contact and sliding surfaces between the rotating and the fixed parts are perfectly clean.

- Place the joint 4510 and fit the support 3110 onto the shaft joining it to the housing 4213 by tightening the screws 6579.
- Assemble the bearing 3011.1 by carefully pushing it into its housing using a device resting on both the external and the internal ring.
- Place the joint 4510.1, fit the pump cover 1221 onto the shaft and join it to the support 3110 by tightening the screws 6579.1.
- The screws 6579 and 6579.1 shall be tightened until the surfaces of the relevant covers are close together.
- Fit the gland packing 4130 into its seat with the relevant follower 4131, if necessary act on the follower to push the gland packing until seeing the clip housing 6546. Then fit the above-mentioned clip.
- Mount the impeller 2200. Screw the impeller nut 2912 making sure that it is completely tightened.
- Reassemble the half coupling hub.

6.6.2 Final assembly

- Place the joint 4590 into its seat and mount the pumping unit on the pump casing. The nuts 6572.2 shall be tightened gradually and alternately with special care; at the end of the operation, control by means of a thickness gauge that the space between the two elements to be joined is the same along the whole circumference.
- Check the alignment between pump and motor half coupling (see 3.2.3). Remount the support foot 3134 by tightening first the two screws 6579.2 anchoring it to the base and only afterwards the screw 6581.6 connecting it with the support.
- Fill in clean diathermic oil through the filling plug R1.
- Refer to the indications in paragraph 3 and 4 for positioning and starting.

7 FAILURES

7.1 DEFECTIVE WORKING

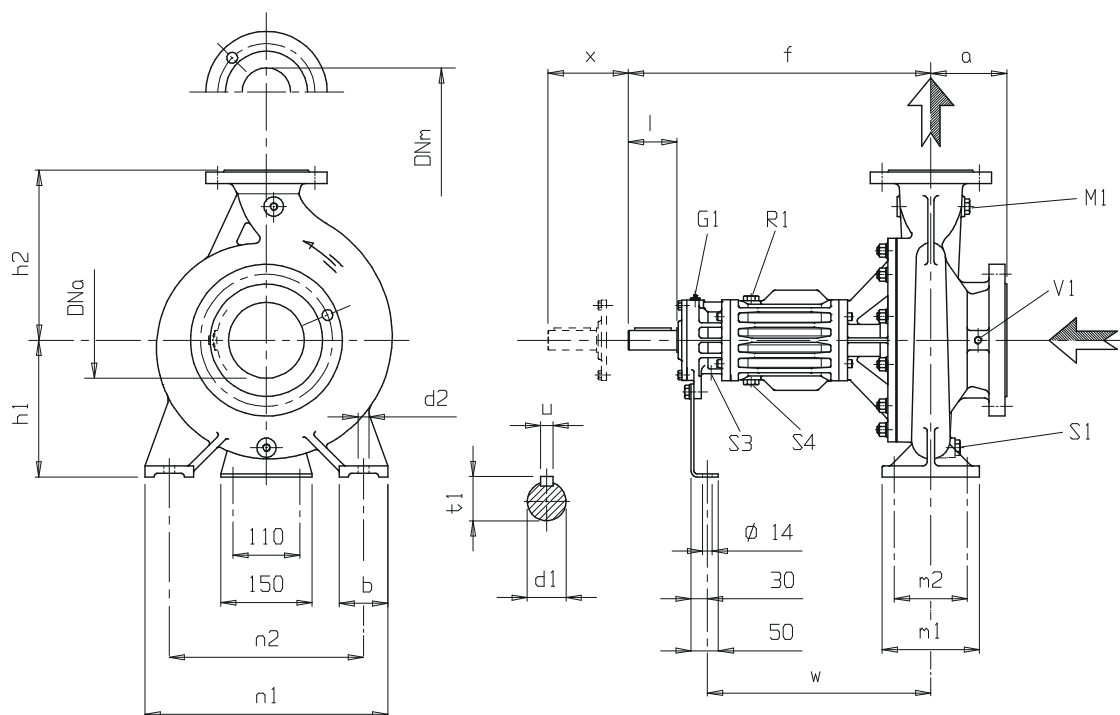
DEFECTS	POSSIBLE CAUSES (see 7.2)
The motor stops	2
Excessive power absorption	6-9-10-15
Insufficient flow rate	1-3-4-5-7-8-9-11
Insufficient head	3-4-7-8-9-11
Support temperature increase	16-17-18
Bearing temperature increase, coupling side	19-23-21-24-27
Vibrations and noise	1-8-13-14-15-16-20-21-22-24-27
Mechanical seal leak	12-13-14
No delivery from the pump	1-3-4-5-8
Short service life of the bearing, pump side	17-18-25
Short service life of the bearing, coupling side	19-21-23-24-27
Short service life of the mechanical seal	13-14-15-17-18-26
Short service life of the coupling elastic parts	21-24

7.2 CAUSES AND REMEDIES

	CAUSES	REMEDIES
1	<i>Irregularities of the suction pipe</i>	
1a	Excessive head loss	Check the cleaning of filters. Check that the suction gate valve is completely open. Check the size and way facilitating as much as possible the liquid flow.
1b	Presence of air	Eliminate traps and counter slopes. Bleed the pump and the plant. Check connections and the relevant joints.
2	<i>Irregularities of the electric system</i>	
2a	One stroke is missing	Check fuses and connections
2b	Too low voltage	Check the feeding system
2c	Intervention of the overload cut-out	Check calibration with data on the motor rating plate Excessive power absorption (see 6,9,10,15,16)
2d	Winding of the earth motor	Replace the motor or rewind the stator
2e	Wrong supply voltage	Check the position of the connecting links
3	Low rotation speed	See 2a-2e
4	Wrong direction of rotation	Invert the connection of two of the three power supply cables
5	Required head above the one indicated on the rating plate	Increase the impeller diameter or the rev./1' (ask the manufacturer)
6	Flow rate above the one indicated on the rating plate	Adjust the delivery gate valve
7	Excessive space between impeller and housings	Replace impeller and/or wear rings
8	The impeller is damaged or obstructed by foreign bodies	Clean or replace impeller
9	Excessive viscosity of pumped liquid	Ask the manufacturer
10	The pumped liquid specific weight exceeds the foreseen one	Ask the manufacturer
11	Presence of air in the pumped liquid	Check the plant
12	Worn or damaged mechanical seal	Replace the mechanical seal
13	Bent shaft	Replace the shaft
14	The shaft is rotating out of position because of bearing wear	Replace the bearings
15	Irregular friction between rotating and fixed parts	See 13-14-16 Check that nuts 6572.2 (fig. 6) are correctly tightened
16	Worn or damaged bearings	Replace the bearings
17	Excessive blow-by of pumped liquid in the support	Check the efficiency of the gland packing and the condition of the shaft surface
18	No oil in the support	Carry out refills at regular intervals (see 6.2)
19	Insufficient lubrication	Comply with the intervals of lubrication. Check the type of grease used at high temperatures (see 6.2)
20	Operation with excessively reduced flow rate (20% lower than that mentioned on the rating plate)	Check the adjustment of the delivery gate valve (see 4.2). Ask the manufacturer.

	CAUSES	REMEDIES
21	Coupling not perfectly aligned	Check the alignment when the pump is hot (see 27)
22	Pipes and/or pump non suitably fixed to the relevant supports	Check the anchorage, including the anchor bolts of the base
23	Excessive axial thrust	Check if the impeller balancing holes are free
24	Contact between motor shaft and pump	Check that the distance between motor shaft and pump is enough to allow for thermal expansions without causing any contact between them.
25	The pumped liquid contains abrasive substances	Check the filters. Replace the oil of the plant
26	The oil of the support is dirty	Carry out refills at regular intervals (see 6.2)
27	The pump undergoes excessive stresses of the pipes on the flanges	Eliminate all stresses by controlling the pipe supports and/or the position of the pump (then check again the coupling alignment)

8 SIZE AND WEIGHT



G1 – grease cup 1/4" gas
R1 – oil filling 3/8" gas
S3 – mechanical seal drain connection 1/4" gas
S4 – oil drain plug 1/4" gas

M1 – pressure gauge connection
S1 – pump drain plug
V1 – vacuum gauge connection

	Flange size PN 16- UNI 2237				
	DN	DE	CF	Holes no.	f
	32	140	100	4	18
	40	150	110	4	18
	50	165	125	4	18
	65	185	145	4	18
	80	200	160	8	18
	100	220	180	8	18
	125	250	210	8	18
	150	285	240	8	22

Type Size	Supp.	DNa	DN	a	f	h1	h2	b	m1	m2	n1	n2	d2	w	x	d1	u	t1	l	M1	S1	V1	kg
32-20 - 20A	1	50	32	80	385	160	180	50	100	70	240	190	14	285	100	24	8	27	50	3/8"	1/4"	1/4"	50
32-26 - 26A	2	50	32	100	500	180	225	65	125	95	320	250	14	370	100	32	10	35	80	3/8"	1/4"	1/4"	78
40-20	1	65	40	100	385	160	180	50	100	70	265	212	14	285	100	24	8	27	50	3/8"	1/4"	1/4"	53
40-26	2	65	40	100	500	180	225	65	125	95	320	250	14	370	100	32	10	35	80	3/8"	1/4"	1/4"	79
50-20	1	80	50	100	385	160	200	50	100	70	265	212	14	285	100	24	8	27	50	3/8"	1/4"	1/4"	54
50-26	2	80	50	125	500	180	225	65	125	95	320	250	14	370	100	32	10	35	80	3/8"	1/4"	1/4"	82
65-20	2	100	65	100	500	180	225	65	125	95	320	250	14	370	140	32	10	35	80	3/8"	1/4"	1/4"	76
65-26	2	100	65	125	500	200	250	80	160	120	360	280	18	370	140	32	10	35	80	3/8"	1/4"	1/4"	88
80-20	2	125	80	125	500	180	250	65	125	95	345	280	14	370	140	32	10	35	80	3/8"	3/8"	3/8"	82
80-26	2	125	80	125	500	225	280	80	160	120	400	315	18	370	140	32	10	35	80	3/8"	3/8"	3/8"	100
100-20	2	125	100	125	500	200	280	80	160	120	360	280	18	370	140	32	110	35	80	1/2"	3/8"	3/8"	96
125-20	2	150	125	140	500	225	315	80	160	120	400	315	18	370	140	32	10	35	80	1/2"	3/8"	3/8"	115
100-26	2	125	100	140	510	225	280	80	160	120	400	315	18	380	140	32	10	35	80	3/8"	3/8"	3/8"	112



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