

Zapfwellenpumpe 13.0554.00 - 13.0555.00 - Bedienungsanleitung

Pompa autoadescante a canale laterale Self-priming side channel pump

Tipi / Types:

I 20	BS 30	X 40	IFE 25	IFM 25
I 25	BS 40	X 50	IFE 30	IFM 30
I 30	BS 50	ALX 40	IFE 35	IFM 35
I 35	ALBS 40	ALX 50	IFE 40	IFM 40
I 40	ALBS 50		IFE 50	IFM 50
I 50			ALFE 25	ALFM 25
AL 20			ALFE 40	ALFM 40
AL 25			ALFE 50	ALFM 50
AL 40				
AL 50				

I MANUALE D'USO E MANUTENZIONE

GB USER AND MAINTENANCE MANUAL

Ed.: 02 Rev.:0

GB

Translation of the original instructions

Parts of text and drawings may only be reproduced to draw up instructions for use in relation to assemblies in which the components referred to in this manual are incorporated.

Reproduction, for any purpose, is prohibited without prior written consent from the manufacturer.

WARNINGS

Before installation read this manual carefully.

The products described are classified as components and not as machinery or partly completed machinery, as the intended use and the actuation source are unspecified.

The manual characterizes the components from a technical viewpoint and provides indications for installation, use and maintenance, but the person who constructs the assembly in which one of these components is used is solely responsible for ensuring that the assembly complies with all applicable laws, in particular those concerning safety. Therefore, installation of these components must be carried out by qualified technicians.

The manufacturer shall not be held responsible in cases of improper use of the components, total or partial failure to comply with the instructions indicated herein, unauthorized modifications and operations, use of non-original spare parts or parts not relative to the specific model.

1 - DESCRIPTION OF SYMBOLS USE

 Safety hazard	 Danger of electric shock	WARNING Danger of damaging the pump
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2 - DESCRIPTION AND USE OF THE COMPONENT

The components described in this manual are self-priming pumps of "side-channel" type. They have been designed and manufactured specifically for transferring and handling liquids, thanks to some important features:

- very rapid self-priming capacity, i.e. suction of air contained in the suction hose to start pumping;
- no damage if the liquid in the suction tank finishes;
- possibility of reversing the flow of liquid by reversing the direction of rotation of the shaft.

 These components are not suitable to produce ATEX equipment (for explosive atmospheres)
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The pumps described in this manual are divided into two large families:

- with pumping body made entirely of CB754S brass (series I, IFE, IFM, BS, X)
- with pumping body made entirely of AISI 316 stainless steel (series AL, ALFE, ALFM, ALBS, ALX)

They must be coupled to an actuation source using the following methods:

- series I, AL: coupling with pulley or flexible joint;
 - series IFE, ALFE: coupling with pulley through direct current electromagnetic clutch;
- NOTE:** the designation of these components is of the type **IFE 25 - 12**, where the number 25 expresses the dimension of the pump and the number 12 expresses the supply voltage of the clutch; in the rest of the manual, indication of the supply voltage will be excluded from the designation;
- series IFM, ALFM: coupling with pulley through manual clutch;
 - series BS, ALBS: direct coupling with a hydraulic motor;
 - series X, ALX: coupling with low speed power take-off through speed-up gearbox.

2.1 - SPECIFICATIONS OF PUMPED LIQUID

 WARNING The liquid to be pumped:

- **must have no hard suspended particles** (sand, gravel, etc.) which can cause rapid wear of internal parts. If the liquid to be pumped has this risk factor, install a suitable filter in the suction hose.

- **Must not be aggressive towards the materials with which it comes into contact, i.e.:**

- 1) the material of which the pumping body is composed (CB754S brass or AISI 316 stainless steel)
- 2) the material of which the shaft is composed (ref. 51 in the drawings), i.e. AISI 304 stainless steel (brass pumps) or AISI 316 (stainless steel pumps)
- 3) the materials of which the gasket and the sealing device are manufactured
- 4) (only for models with by-pass) acetalic resin.

- **Must have suitable viscosity;** the pump is not suitable for very viscous liquids (such as doughs); the maximum allowable viscosity depends on the power of the actuation source and on the speed.

- With **maximum density** depending on the power of the actuation source coupled to the pump, on the speed and on the head required.

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- **Must have a minimum temperature of:** -15°C, in any case above the freezing temperature of the liquid to be pumped.
- **Must have a maximum temperature of:** varies according to the type of gasket material (see table below); for models with by-pass the maximum pumping temperature is always 90°C.

NBR rubber gaskets (mounted standard)	90°C
EPDM rubber gaskets	110°C
VITON rubber gaskets	130°C
TEFLON gaskets	130°C

Examples of use of the pumps:

Brass pumps	-Water, sea water, gas oil, oil, soaps
AISI 316 stainless steel pumps	- liquid foods, such as wine, vinegar, olive oil, milk; for these uses appropriate methods of washing and disinfecting the pump must be adopted, according to type of liquid (see Chapter 4.4) - compatible corrosive liquids (such as fungicides or liquid fertilizers) - the same liquids permitted for brass pumps, in this case ensuring a much longer useful life.

3 - TECHNICAL DESCRIPTION

3.1 - SPECIFICATIONS

The pump can perform suction of liquid from one port (suction port), sending it to the other port (discharge port); The parameters involved in a pumping problem are:

- 1) **capacity Q:** quantity of liquid transferred in a given time; it expresses the pumping speed
- 2) **total manometric head H** required by the installation equivalent to the sum of two contributions:
 - difference in height (measured vertically) between the level of liquid in the tank of discharge and that of the tank or suction;
 - energy losses caused by liquid flow in pipes (charge losses)
- 3) **rotation speed** of the pump shaft
- 4) **mechanical power absorbed** at the pump shaft, which the actuation source must supply.

Table A indicates, for the various pump types, the capacity (in litres per minute) and the absorbed power (in HP) as a function of the total manometric head (in metres) at three operating speeds: 1400, 1900, 2800 rpm; the data refer to operation with clean water at 20°C.

The same table also indicates the value of the maximum head Hmax developed by the pump (expressed in bar, unit of pressure measurement), which is reached when the discharge port of the liquid is closed.

3.2 - LIST OF COMPONENTS

Table B contains the list of all components, and refers to figures in the pages 2 and 3.

Fig. 1a: exploded drawing of part of pump type 25/30/35/40/50

Fig. 1b: exploded drawing of part of pump type 20

Fig. 2: fixing heights of the pump support and of the speed-up gearbox

Fig. 3a and Fig. 4: mechanical seal and its different fixing systems

Fig. 3b: lip seal

Fig. 5: positions of the threaded holes for fixing protective screens in models series X and ALX

Fig. 6: method of removing the impellers forced onto the shaft

Fig. 7: drawing illustrating the pump support part (series I/AL)

Fig. 8: drawing illustrating the pump support part (series IFM/ALFM)

Fig. 9: drawing illustrating the pump support part (series IFE/ALFE)

Fig. 10: drawing illustrating the pump support part (series BS/ALBS)

Fig. 11: drawing illustrating the pump support part (series X/ALX).

3.3 - MAXIMUM PRIMING HEIGHT

The maximum priming height is the maximum difference in level between the pump and the level of the liquid to be pumped with which it can perform suction of air from the suction hose and start pumping.

With water at 20°C this value can reach 6 metres, but it depends on the quantity of liquid present inside the pump during priming; this quantity depends on the installation methods of the pump and on the configuration of the hoses.

When the pump starts up the impeller tends to empty the pump body and consequently reduce the priming capacity. To obtain maximum priming, install the suction and discharge hoses so as to create an upward extension of the ports, so that the liquid flows back into the pump body and increases the quantity of liquid remaining inside the pump after it has stopped.

3.4 - SHAFT SEALING DEVICES (ref. 67)

The impeller, i.e. the rotating mechanical part that allows the pump to operate is activated through a shaft by the actuation source (ref. 51 fig. 7 to 11); the pump body has an opening for the shaft to pass through. The "shaft seal" is the device that prevents liquid from leaking through the space between the shaft and the pump body. Table C shows the types of seal supplied standard or on request for each model. Unless otherwise indicated by a label affixed to the pump, the seal present is of standard type.

- (only series IFM, ALFM) take the control lever of the clutch to position B (fig. 8); in this position the pulley is disconnected from the pump shaft;

series X, ALX

- unscrew the breather plug (ref. 94 fig. 11) and fill the speed-up gearbox with oil type SAE 90 to the level indicated by the oil level plug (ref. 95 fig. 11);
- mount the protective structures indicated by the designer;
- connect the spline shaft of the pump (ref. 60 fig. 11) to the actuation source according to the methods indicated by the designer;

series BS, ALBS

- insert the shaft of the hydraulic motor in the joint (ref. 57 fig. 10);
- insert the pilot Ø80 of the motor into the corresponding seat in the hydraulic motor flange (ref. 58 fig. 10);
- connect the pump and the hydraulic motor using 4 M8 bolts;
- insert the assembly into the hydraulic system.

4) Fill the pump body with liquid to be pumped through one of the ports, avoiding spillage from this or from the other port. Traces of lubricant (cutting fluids, greases) may be present on the inner walls of the pumping body. If these substances can pollute the liquid to be pumped (i.e. food substances), initial pumping must be performed following the cleansing procedure described in Chapter 4.4.

5) Screw the hose fittings to the pump ports (ref. 25/26), after checking that the gaskets are present in the fittings, according to the designer's specifications.

6) Prepare the two liquid suction and discharge hoses according to the designer's specifications; insert the ends of the hoses into the hose fittings; secure the connection using cable clamps; if provided, install the filter in the suction hose; the hose must not exert excessive force on the pump. Avoid excessive bending of the hoses to avoid kinks. Insert the free end of the suction hose into the receptacle from which liquid is to be drawn, at a depth at least twice the diameter of the hose and at the same minimum distance from the bottom. Insert the free end of the discharge hose into the receptacle to receive the liquid.



The discharge hose must be fixed, without compressing it, to prevent extraction from the collection receptacle during start-up or operation, which would wet and contaminate the surrounding environment.

4.3 - PUMP START-UP



Do not start the pump before having completed installation.

Under no circumstances insert fingers or other body parts through the ports: the pump contains moving parts.

In the event of use with dangerous liquids, wear personal protective equipment selected according to the specifications of the liquid, to prevent danger of contamination or contact with exposed body parts.

1) To draw air from the suction hose and start pumping (priming) the pumping body must be filled with liquid; the pump only requires to be filled during installation, as although the hoses may empty through gravity at the end of each pumping operation the body always remains full.

However, if the pump has been emptied, it must be filled again:

- make sure that the actuation source has stopped and cannot start up during this operation
- unscrew one of the 2 hose fittings
- fill the pump body avoiding spillage
- screw the hose fitting back on.

WARNING

Do not operate the pump dry.

2) start the pump by switching on the actuation source.

- (only series IFE, ALFE) switch the switch from the electrical power source of the clutch to "ON"
- (only series IFM, ALFM) take the control lever of the clutch to position A (fig. 8)

After a few seconds required for priming, the pump will start to transfer liquid;

- (only series IFE, ALFE, IFM, ALFM) when pumping for the first time, the clutch must be engaged and disengaged about 10 times to allow it to adapt and operate correctly (breaking in).



If the hoses have not been connected correctly, this may cause leakages or sprays of liquid.

3) Stop pumping: stop the actuation source, or:

- (only series IFE, ALFE) switch the switch from the electrical power source of the clutch to "OFF"
- (only series IFM, ALFM) take the control lever of the clutch to position B (fig. 8).

WARNING

Even after it is switched off the pump remains filled with liquid; if there is any chance of the outdoor temperature dropping below the freezing point of the liquid, empty the pump after use to prevent the pump body from breaking.

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4.4 WASHING



Before removing the hoses discharge any pressure present inside the pump. If accessible surfaces are hot (see Chapter 5.1) wait for the pump to cool before handling it or use appropriate gloves.

If the pump is used for dangerous substances, the user is responsible for defining the procedures for handling, washing, storing and disposal of waste fluids in compliance with the safety regulations in force for the specific substances treated.

If the pumped liquid has no particular problems, (i.e. water, sea water or soap), in the event of an extended period of disuse, wash the inner walls of the pump by pumping clean water, empty completely, dry the outer surfaces with a soft cloth.

Cleansing procedure

This allows deeper cleaning than the procedure described previously and can be used in many cases. In uses with foods it is performed during installation and as part of the wash cycle.

- Prepare a deterative solution in a receptacle (i.e. common dishwashing liquid diluted with clean hot water at 40-50 °C).
- Insert the suction and discharge hoses of the pump into the receptacle and recirculate the liquid for 5 minutes.
- Pump clean water until complete rinsing is obtained.

Use with slightly perishable food substances (vegetable oil, wine, vinegar)

Before and after use:

- Carry out the cleansing procedure;
- use the pump to recirculate a suitable sanitizing and disinfecting solution (i.e. based on peracetic acid) for an adequate time;
- rinse the inside of the pump body by pumping clean water until the sanitizing and disinfecting solution has been completely eliminated.
- Before use, perform the start-up procedure, discarding a first fraction of liquid. Dispose with the fluid used for washing and the discarded liquid from start-up in compliance with the current provisions of law.
- In the specific case of use with vegetable oils, if the pump is to remain in disuse for a short period of time and subsequently used again for the same type of oil, it can simply be emptied and the ports capped.

Use with highly perishable food substances (such as milk)

Wash before use, at each time interval established by the HACCP protocol applied and after use, disassembling the pump, cleansing and disinfecting its parts with methods depending on the type of liquid. This operation must be carried out by qualified personnel experienced in performing the pump disassembly and reassembly procedures.

4.5 USE OF THE BY-PASS (optional device)

The by-pass is a device to adjust capacity and head of the pump and is located on the outside in the form of a knob; it can be rotated counter-clockwise to reduce the maximum capacity to around half and the maximum head by around a quarter. During the priming stage close the by-pass by rotating the knob completely clockwise, as priming capacity is greatly reduced with the by-pass open.



If the by-pass is fitted, assess the residual risk involved by activating it with the pump operating and, if necessary, provide protective screens.

4.6 – DEMOLITION

At the end of its useful life the pump must be demolished, in strict compliance with the standards in force in the country of use. Do not neglect any residue of liquid present inside the pump body.



Only for series IFE and ALFE in EU countries:

The pump belongs to the category of electric and electronic equipment (EEE). The symbol shown here means that it cannot be disposed of as domestic waste. At the end of its useful life the owner must deliver the pump to a WEEE collection point, where it will be subjected to recycling. For more information, contact the relevant local authority department or the store from which the pump was purchased.

5 – INFORMATION ON FURTHER RISKS

5.1 - TEMPERATURE OF ACCESSIBLE SURFACES



The outer surfaces of the pumping body reach the temperature of the pumped liquid, and can therefore be very hot or very cold. In the event of these temperatures representing a danger, the user must adopt suitable protective measures (enclose the pump with barriers, handle using suitable gloves).

5.2 - RISKS CAUSED BY SPATTERING AND LEAKAGE OF FLUIDS

Undesirable leakage or spraying of liquid may occur, for example, in the following cases:

- installation procedure carried out incorrectly;
- wear and tear of hoses;
- wear and tear of sealing device (resulting in spattering of liquid from the space between the flange and the pump body) or of other gaskets (O-ring or counterflange gasket);
- corrosion of the pump body;
- incorrect reassembly after maintenance;
- pumping of cold liquids, with water vapour condensation forming on the outer surface of the pumping body and consequent dripping.

These events cause a wet environment (with danger of electric shock, danger of slipping, etc.) and the risk of persons, animals or objects being struck by jets of liquid. In particular, maximum caution must be taken when pumping liquids that are flammable, corrosive, at high temperature or in any way dangerous for living things or for the environment. The user

must assess these risks and if necessary provide appropriate protection from jets of liquid (i.e. screens) and collection vessels in a suitable position. Liquid from leakages must be removed and disposed of correctly and safely.

6 - CERTIFICATION

I 20	AL 20	BS 30	ALBS 40	X 40	ALX 40	IFE 25	ALFE 25	IFM 25	ALFM 25
I 25	AL 25	BS 40	ALBS 50	X 50	ALX 50	IFE 30	ALFE 40	IFM 30	ALFM 40
I 30	AL 40	BS 50				IFE 40	ALFE 50	IFM 40	ALFM 50
I 35	AL 50					IFE 50		IFM 50	
I 40									
I 50									

as "components" as they do not have a specific intended purpose. Therefore, they do not fall within the field of application of the Machinery Directive 2006/42/EC. Any person using these components to produce machinery or partly completed machinery must comply with the safety requirements established by the Machinery Directive 2006/42/EC.

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8 – NOTES FOR THE SERVICE TECHNICIAN

 The following chapters 8.1, 8.2, 8.2.1, 8.2.2, 8.2.3 are for the exclusive use of qualified and expert maintenance technicians, who operate in compliance with the safety regulations. In particular, during maintenance operations the actuation source must be stopped and it must not be possible to start it

8.1 - DISASSEMBLING THE HYDRAULIC PART

 Before disassembly discharge any pressure present inside the pump, wait for it to cool, empty it and dispose of the liquid contained appropriately; if the pump is used for dangerous substances comply with the safety regulations in force for handling of these substances.

The references below can be found in the figures at the beginning of the manual on the basis of the indications in paragraph 3.2.

- Unscrew the screws of the cover (ref. 11).
- Remove the cover.
- Remove the O-ring (ref. 12).
- Extract the impeller (ref. 13) as follows:
brass models type 20-25-30-35-40: the impeller slides on the shaft (ref. 51), can be extracted simply using your fingers;
brass models type 50 and all stainless steel models (fig. 6): the impeller is forced onto the shaft; to remove it use an extractor with appropriately shaped claws; the hub of the impeller is provided with two projections for this purpose; for stainless steel models type 20 use the two projections present on the side of the pump body for extraction.
- Remove the tab (ref. 15).
- Extract the pump body (ref. 10) from the shaft.
- (Only for brass models type 20) extract the counterflange (ref. 5) from the pump body and remove the gasket (ref. 8).

8.2 - ASSEMBLING THE HYDRAULIC PART

(For brass models type 20, first insert the counterflange ref. 5 and position the gasket ref. 8);

- Insert the tab (ref. 15) in its seat
- Insert the pump body (ref. 10) along the shaft (ref. 51)
- Position the O-ring (ref. 12) in its seat on the pump body

Models with sliding impeller

- Insert the impeller (ref. 13) over the shaft using your fingers.
- Fit the cover (ref. 11) and insert the screws, gradually and alternately tightening opposite screws.

Models with forced impeller

- The impeller is inserted using a hollow bar with internal diameter slightly larger than that of the shaft.
- To avoid damaging the bearings, rest the back of the shaft on a soft metal surface.
- Striking the impeller (ref. 13) in a central position using the hollow bar and a hammer, move it towards the wearing surface, leaving 0.1 mm clearance.
- Fit the cover (ref. 11) and insert the screws, gradually and alternately tightening opposite screws.
- Strike the back of the shaft with a punch and hammer.
- Check that the impeller rotates freely.

8.2.1 – REPLACING THE LIP SEAL (brass models type 20 and 50)

The reference below refer to figs. 1a and 1b.

- Remove the worn lip seal (ref. 67d) from its seat (located in the counterflange ref. 5 for models type 20 and in the pump body ref. 10 for models type 50) striking it using a solid drift of suitable dimensions as shown in fig. 18 (type 20) or fig. 20 (type 50).
- Take an identical new lip seal and place it against the mouth of its seat as shown in fig. 19 (type 20) or fig. 21 (type 50) facing in the correct direction (the spring must be facing the inside of the pump).
- Insert the lip seal in its seat by striking it using a solid drift with a slightly smaller diameter to that of the outer diameter of the lip seal until it has been completely inserted.

8.2.2 - REPLACING THE LIP SEAL (brass models type 25-30-35-40)

The pump body is produced in two pieces: pump body (ref. 10) and rear internal part (ref. 65), which is inserted into the pump body (fig. 1a shows the two parts disassembled, fig. 12 after assembly). To replace the lip seal (ref. 67d) the rear internal part must be extracted from the pump body.

- Place the edge of the pump body on two surfaces made of soft material (i.e. wood or aluminium) or any other material, provided that two pieces of paper are placed between surface and body (fig. 12).
- Take a solid drift (with diameter 28-29 mm and length greater than 60 mm) and strike the lip seal until it is extracted from its seat (fig. 13).
- Place the lip seal against the edge of the rear internal part and strike it again with the solid drift and hammer; the internal part will be removed together with the lip seal (fig. 14).
- (Fig. 15) Place the pump body on a surface; take an identical new lip seal and place it against the mouth of its seat, facing in the correct direction (the spring must be facing the inside of the pump) and insert it by striking it using a solid drift with a slightly smaller diameter to that of the outer diameter of the lip seal until it has been completely inserted.
- Place the rear internal part against the body facing in the correct direction (fig. 16).
- Insert the internal part into the body using a solid drift of appropriate dimensions (Fig. 17).

8.2.3 - REPLACING THE MECHANICAL SEAL

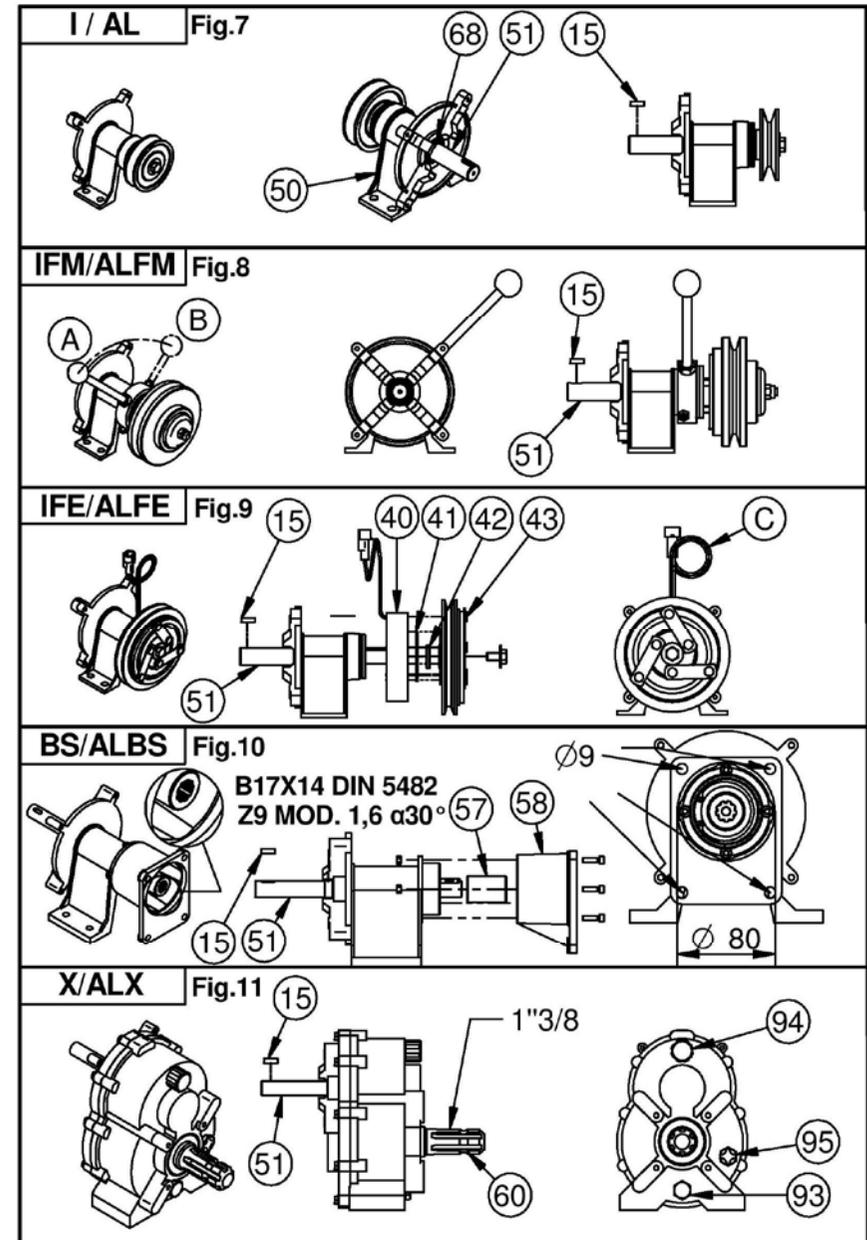
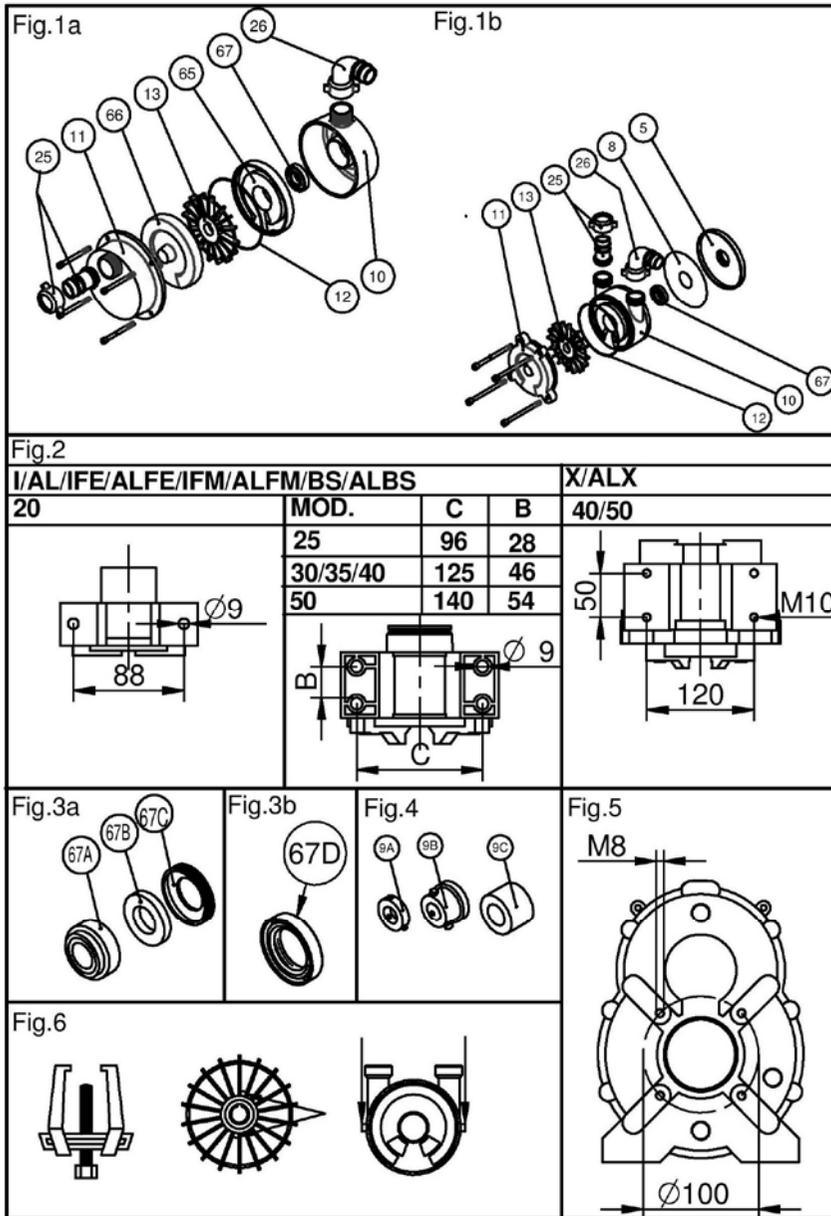
- Carry out the disassembly procedure without extracting the pump body; for models type 20 also remove the body (ref. 10), extracting it from the counterflange (ref. 5).
- Remove the fixing system of the rotating part of the mechanical seal (this can belong to one of the types in fig. 4).
- Extract the rotating part of the seal (ref. 67A Fig. 3a), the counterface (ref. 67B) and the shroud (ref. 67C).
- Take an identical seal, separate shroud and counterface, clean the lapped races of the rotating part and of the counterface with a soft cloth; degrease the housing in the pump body and in the shaft, lubricate rubber parts with soap and water.
- Insert the shroud into the seat in the pump body, followed by the counterface.
- Insert the rotating part of the seal taking care that its rubber parts are not damaged when passing over sharp parts.
- Remount the fixing system of the rotating part of the seal; for systems provided with screws, clamp these so that the length of the rotating part is between 13 and 14 mm.

9 - TROUBLESHOOTING

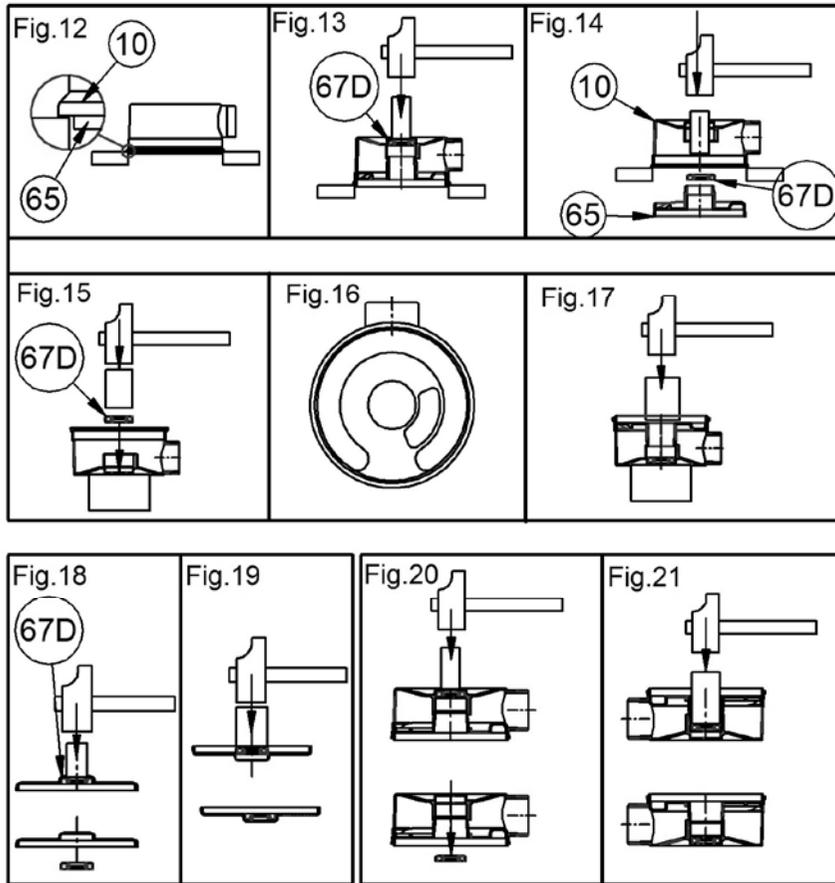
 This chapter is for exclusive use by qualified and expert maintenance technicians, operating in compliance with the safety regulations. In particular, during maintenance operations the actuation source must be stopped and it must not be possible to start it up

Problem	Possible cause	Remedy
The actuation source is on but the pump will not prime	(Only series IFE, ALFE, IFM, ALFM) the clutch is disengaged	Engage the clutch
	Excessive suction height	Check the suction height
	Suction hose end incorrectly positioned	See Chapter 4.2
	Pump not filled with liquid	Fill the pump with liquid
	Infiltrations of air	Check hoses, tightness of hose clamp, fitting gaskets
	Wear and tear on gaskets / seal	Replace the gaskets/seal
Pump bubbling air in the suction tank	Pump worn	Send to a TELLARINI POMPE service centre
	Incorrect pumping direction	Reverse the hose connections to the ports or reverse the direction of rotation
The capacity is low	Low rotation speed	Check the rotation speed
	(Only series I, AL, IFE, ALFE, IFM, ALFM) the belts slip	Check the whole belt transmission system
	(Only series IFE, ALFE, IFM, ALFM) the clutch slips due to dirt	Clean the clutch
	(Only series IFE, ALFE) The clutch slips due to incorrect power supply	Check the power supply
	Infiltration of air or leakage of liquid	Check hoses, tightness of hose clamp, fitting gaskets
	Hoses or filters (if provided) clogged	Clean hoses or filter
	Operating head too high	Check the head
	Pump clogged	Disassemble and clean the pump, reassemble
Pump worn	Send to a TELLARINI POMPE service centre	
Abnormal noise during pumping	Foreign bodies have entered the pump	Disassemble the pump, check and clean, reassemble
	Impeller broken	Disassemble and clean the pump, replace the impeller, reassemble
	Impeller seized	Disassemble, eliminate seizures, reassemble
Pump leaking	Broken bearing	Replace bearing
	Fittings or clamps not tightened	Tighten fittings or clamps
(Series X, ALX) Noisy speed-up gearbox	Wear and tear on gaskets or seal	Replace gaskets or seal
	Lack of lubricating oil	Top up to the correct level with SAE 90 oil

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SERIES I, IFE, IFM, BS

TYPE	1400 rpm					1900 rpm					2800 rpm						
	H (m)	1 m	5 m	10 m	Hmax	H (m)	1 m	5 m	10 m	15 m	Hmax	H (m)	1 m	10 m	20 m	30 m	Hmax
20	Q	15	7		0.7	Q	21	14	5		1.3	Q	32	21	9		2.8
	HP	0.1	0.1			HP	0.1	0.1	0.2			HP	0.2	0.2	0.3		
25	Q	53	38	16	1.3	Q	73	60	44	28	2.4	Q	98	80	58	34	4.8
	HP	0.3	0.3	0.4	bar	HP	0.6	0.7	0.8	0.9	bar	HP	1.1	1.2	1.4	1.6	bar
30, 35	Q	89	71	43	1.7	Q	122	105	85	65	3	Q	169	144	114	86	6
	HP	0.6	0.7	0.8	bar	HP	1	1	1.1	1.2	bar	HP	2.7	3.1	3.7	4	bar
40	Q	149	119	78	1.8	Q	206	180	148	116	3.2	Q	286	244	197	151	6.2
	HP	0.9	1	1.1	bar	HP	1.7	2	2.3	2.6	bar	HP	3.5	4	4.5	5	bar
50	Q	262	227	180	2.8	Q	360	333	298	263	5.2	Q					
	HP	1.6	1.8	2	bar	HP	4	4.3	4.6	4.9	bar	HP					

SERIES AL, ALFE, ALFM, ALBS

TYPE	1400 rpm					1900 rpm					2800 rpm						
	H (m)	1 m	5 m	10 m	Hmax	H (m)	1 m	5 m	10 m	15 m	Hmax	H (m)	1 m	10 m	20 m	30 m	Hmax
20	Q	11			0.5	Q	18	9			0.9	Q	28	17	5		2.4
	HP	0.1				HP	0.1	0.1				HP	0.2	0.2	0.3		
25	Q	43	28	8	1.2	Q	59	47	32	18	2	Q	89	70	48	26	4.2
	HP	0.2	0.2	0.3	bar	HP	0.5	0.7	0.8	0.9	bar	HP	1	1.1	1.2	1.4	bar
40	Q	137	112	76	2.1	Q	183	157	124	92	3.5	Q					
	HP	0.7	0.8	0.9	bar	HP	1.7	2	2.3	2.6	bar	HP					
50	Q	205	176	140	3	Q						Q					
	HP	1.1	1.3	1.4	bar	HP						HP					

SERIES X

TYPE	220 rpm					300 rpm					450 rpm						
	H (m)	1 m	5 m	10 m	Hmax	H (m)	1 m	5 m	10 m	15 m	Hmax	H (m)	1 m	10 m	20 m	30 m	Hmax
40	Q	149	119	78	1.8	Q	206	180	148	116	3.2	Q	286	244	197	151	6.2
	HP	1	1.1	1.3	bar	HP	1.9	2.2	2.5	2.9	bar	HP	4	4.5	5	5.5	bar
50	Q	262	227	180	2.8	Q	360	333	298	263	5.2	Q					
	HP	1.7	1.9	2.2	bar	HP	4.4	4.8	5.1	5.5	bar	HP					

SERIES ALX

TYPE	220 rpm					300 rpm					450 rpm						
	H (m)	1 m	5 m	10 m	Hmax	H (m)	1 m	5 m	10 m	15 m	Hmax	H (m)	1 m	10 m	20 m	30 m	Hmax
40	Q	137	112	76	2.1	Q	183	157	124	92	3.5	Q					
	HP	0.7	0.8	0.9	bar	HP	1.7	2	2.3	2.6	bar	HP					
50	Q	205	176	140	3	Q						Q					
	HP	1.1	1.3	1.4	bar	HP						HP					

Table A

5	Counterflange	26	Curved fitting	66	Internal front part
8	Gasket	40	FE electromagnet	67	Seal
9A	Stainless steel seal retaining ring	41	FE electromagnet retaining ring	67A	Mechanical seal of rotating part
9B	Brass seal retaining ring	42	FE spacer	67B	Mechanical seal of fixed part - counterface
9C	Seal spacer	45	FE pulley assembly		
10	Pump body	50	Pump support	67C	Mechanical seal of fixed part - shroud
11	Pump cover	51	Pump shaft	67D	Lip seal
12	O-Ring	57	Joint	68	Lip seal support
13	Impeller	58	Hydraulic motor flange	93	Oil drain plug
15	Impeller key	60	Spline shaft	94	Oil breather plug
25	Straight fitting	65	Internal rear part	95	Oil level plug

Table B