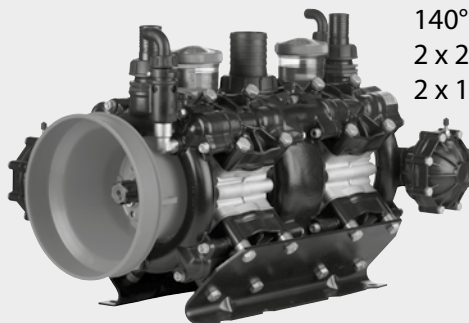




**ANNOVI
REVERBERI**®
The Power of Experience

AR 320 bp Twin
AR 320 bp Twin Top
AR 370 bp Twin
AR 370 bp Twin Top



AR 320 bp Twin
AR 370 bp Twin

140° F - Max Water Temp
2 x 2" - Suction
2 x 1-1/4" - Outlet

AR 320 bp Twin Top
AR 370 bp Twin Top



INSTRUCTION MANUAL

AR320BP • AR370BP - 550 RPM - SEMI-HYDRAULIC EIGHT (FOUR PLUS FOUR) DIAPHRAGM PUMP

MODEL	MAX GPM	MAX L/MIN	MAX PSI	MAX BAR	HP POWER	WEIGHT LBS.
AR320BPTWINTOP-C/C	84.9	321.2	290	20	16.8	127.9
AR370BPTWINTOP-C/C	98.2	371.5	290	20	17.3	127.9

DIAPHRAGM KITS (2)

MODEL	DESCRIPTION
AR43267	BlueFlex
AR43265	Desmopan
AR43264	NBR
AR43266	Viton

VALVE KITS (2)

MODEL	DESCRIPTION
AR2374	Valves

O-RING KITS (2)

MODEL	DESCRIPTION
AR42510	O-Rings

OIL

MODEL	DESCRIPTION
AR64532D	Oil
AR64532D-C	Case (6)Oil



Intended uses

The pump is designed and constructed for incorporation in plants and machinery (spraying machines for the protective treatment of agricultural crops and garden plants). **All other uses constitute misuse unless approved by the manufacturer's technical service**

The pump must be used in a manner appropriate to its technical data (see "Technical Data"), and must not be modified or improperly used.

Misuses

Do not put the pump into service until the plant or machinery in which it is incorporated has been declared compliant with the relevant national and local legal requirements.

Do not use the pump in a potentially explosive atmosphere.

Do not use the pump for **flammable**, toxic or corrosive liquids or liquids with unsuitable density, especially **seawater, adhesives, bitumens, asphalt sealers, two-step curing compounds, concrete sealers, liquefied gases or solvents** of any kind, paints of any kind or liquids containing solids in suspension, and in all cases **do not** use with any liquid unless certain that it is compatible with the materials used in the pump circuit.

Do not draw in liquids at temperatures above 50°C or below 5°C.

Do not use the pump in drinking water supply systems.

Do not use the pump on products for human consumption.

Do not use the pump on pharmaceutical products.

Do not use the pump without first checking that the intake and delivery circuit pipelines are correctly secured and free from leaks.

Do not use the pump without the safety devices provided: guards for shafts and drive couplings and suitably rated relief valve on the delivery circuit.

Do not use the pump to wash or spray: people, animals or delicate items, live electrical equipment or chemicals whose characteristics are not known.

Safety devices



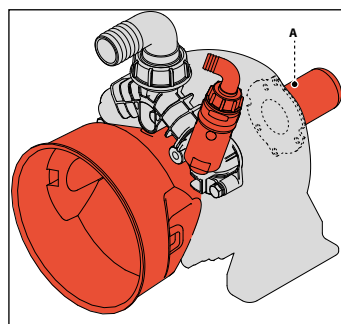
Danger - Warning

Never tamper with or by-pass the safety devices. Maintain all safety devices regularly to ensure they all work efficiently.

The drawing shows the position of the safety devices mounted on the machine.

Additional safety devices must be added as necessary during the design phase (see "Installation information").

A) Fixed guard: provides protection against accidental contacts with the drive shaft when in operation.



Residual risks

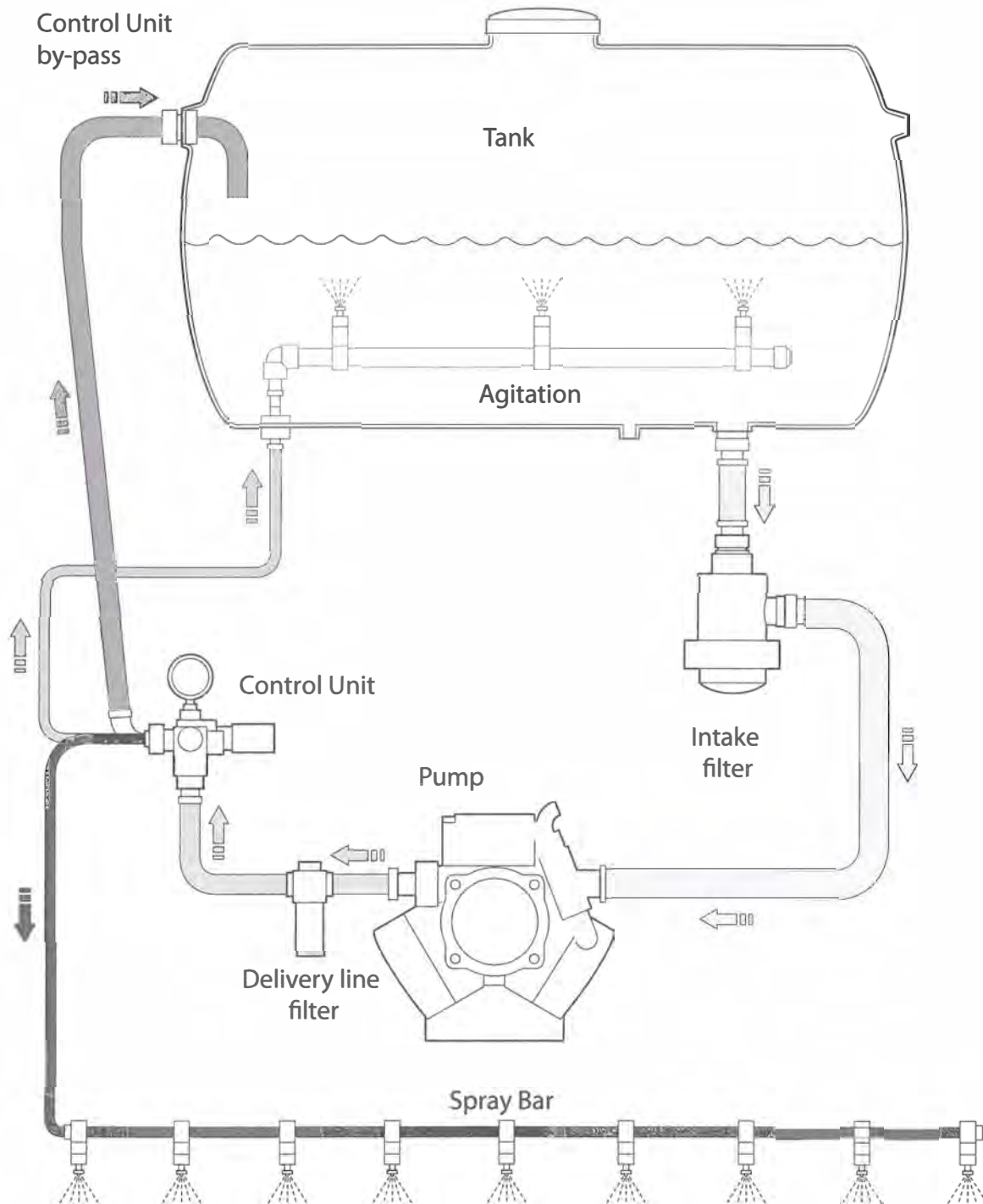
Even if the safety regulations and information provided in the manual are complied with, the residual risks described in the declaration of incorporation still apply when the pump is in operation.



INSTALLATION INSTRUCTIONS

Installation diagram (guideline)

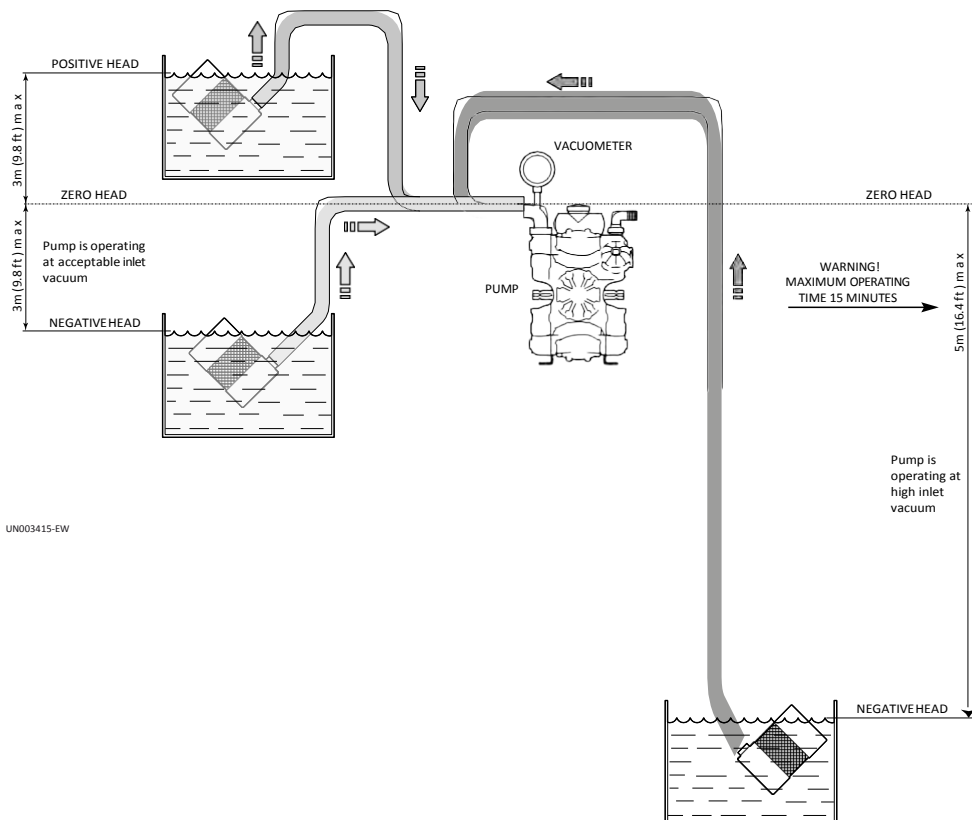
The following is a simplified illustration of the typical installation layout and is purely a guideline.



General guidelines on water supply connection

To operate correctly, the diaphragm pump must draw in liquids from containers at atmospheric pressure. **Do not supply the pump with pressurised liquids.**

For continuous duty, the pump should not draw in water by gravity from containers with liquid level at heights above 3 m.



For continuous duty, the pump should not draw in liquids by vacuum from containers with the liquid level more than 3 m below the pump intake fitting and the circuit must consist of hoses of length and diameter appropriate to the pump intake fitting (see "Technical Data"), free from restrictions and elbows, and with a filter of suitable capacity (see "Installation").

For occasional duty, such as filling water supply tanks, the pump can be operated at a vacuum drawing in liquids from reservoirs having the surface of the liquid up to 5 m below the pump intake fitting, for periods of no more than 15 minutes.

Drawing in liquids from lower levels or for longer times causes cavitation in the pump circuit and reduces the lifetime of the diaphragms, valves and mechanical parts.



Safety recommendations for handling and lifting

Before starting the operations, organise the intended working area so that the materials can be lifted and handled in safety.

Unloading, loading, handling and lifting operations must be carried out by skilled, authorised, specifically trained staff.

During lifting and handling operations, the people not involved in the operations must remain at a safe distance.

For lifting, use hooks and ropes which are free from damage and appropriate for the load to be lifted.

Packaging description and unpacking

The packaging normally consists of a cardboard box for easy, safe transport.

Depending on the quantity of goods to be shipped and the place of destination, packages may be fixed on a pallet for easier lifting and handling.

Check the weight of the item on the transport documents to allow the use of suitable lifting equipment.

When unpacking, check that all components are present and intact. If items are missing or damaged, contact the dealer or manufacturer to agree the procedures to be followed.

The packaging material must be disposed of appropriately in accordance with the relevant statutory requirements.

Transport

The pump may be shipped by a variety of means of transport (road, rail, sea or air) depending on its destination. Secure the packaging firmly to the vehicle during transport, to prevent random movement.

Storage

In the event of a lengthy period out of use, place the pump (in its packaging if possible, or otherwise protected) under cover, protected from the weather.

Do not store in places where the ambient conditions might impair the pump's operating condition over time.

Safety recommendations for installation

Take all possible precautions to allow the pump to be installed in a safe, risk-free manner.

All installation phases must be taken into consideration when designing the machinery or plant in which the pump is to be installed.

The design must consider all mounting points, the means of transmission of the energy sources, and the protective and safety devices required by the relevant regulations to prevent the risk of injury.



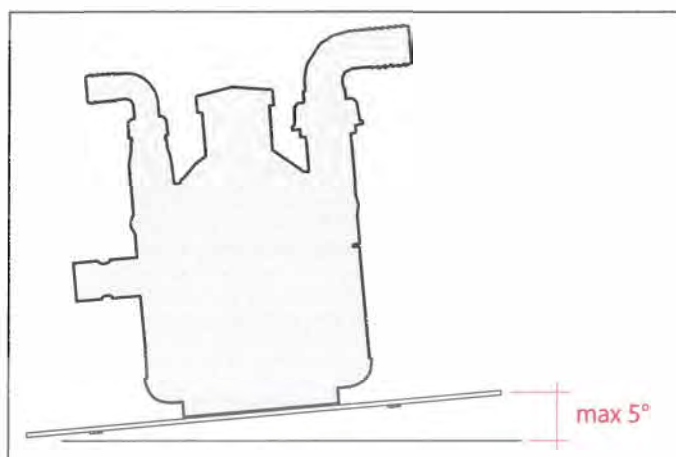
Installation

- The crankshaft may turn in either direction.
- The water connection with the pump must be made using hoses of suitable diameter, in all case no less than that of the pump fittings, securing them to the fittings using good quality clamps. The intake hose must be coil-reinforced to prevent restrictions.
- The pump inlet must be fitted with a filter having suitable capacity for the pump delivery rate and must be designed to generate a vacuum of no more than - 7 Hg. This value can be measured by connecting a vacuum gauge to the pump intake fitting.
- The rated pressure of the outlet hose, fittings and clamps must be no less than the maximum rated pressure of the pump. Replacing the intake and outlet fittings provided on the pump by the manufacturer with smaller diameter alternatives may reduce the pump's performance and void the warranty.

Mounting the pump

The pump must be installed on a horizontal surface with no flexible components between it and the mounting surface.

The illustration shows the maximum permitted pump installation angle beyond which proper lubrication of the crank mechanism is not ensured.



Fix the pump by bolting the pump base onto the machine with suitable bolts, tightening appropriately.



Safety recommendations for use

Before start-up, the operator must perform the necessary safety checks.

In the event of leaks from the pressurized pipes, stop the pump at once and fix the leak.

Do not operate the pump above the limits set by the manufacturer to increase its performance.

Preliminary checks

If the pump has a pressure accumulator, check its level of inflation, see "Checking the inflation pressure".

Check the fittings of the hoses and the pump's intake and delivery circuits to prevent restrictions, the intake of air and leaks of liquid.

Check the pump tank oil level as described in the "Checking the oil level" section.

Before putting the pump into operation, check that the control unit is set for full bypass.

Starting and stopping the pump

To start the pump, proceed as described below.

1. When starting the pump, keep the control unit in the full bypass position until the pump has primed.
2. After starting the pump, and after the pump is primed, move the control unit into the pressure regulation position.
3. During the first few hours of operation, check that the oil level in the tank remains between the minimum and maximum limits. If top-ups are required, use A/R diaphragm pump oil, AR64532D.

To stop the pump, proceed as described below.

1. Reduce the pressure by moving the control unit lever in the full bypass position.
2. Stop the pump.



MAINTENANCE INSTRUCTIONS

Safety recommendations for maintenance



Caution - Take Care

Before doing any maintenance work, depressurise the water system and isolate the pump from all energy sources.

When the jobs are done, before restarting the pump, check that no tools, rags or other materials have been left close to moving parts or in hazardous zones.

Replace any excessively worn components with original parts and use the lubricants recommended by the manufacturer.

Scheduled maintenance table			
Frequency	Component	Procedure	Reference
Every working day	Filter	Inspect filter cartridge	See "Inspecting the filter"
	Pump	Checking the oil level	See "Checking the oil level"
	Connection of pump to power source (pulley, belt, coupling)	Inspection	-
	Pump	Inspect mounting	See "Inspecting the pump mounting"
	Pipes and connections	Inspection	See "Inspecting the connections and pipes"
Every 100 working hours	Pressure accumulator (if installed)	Check inflation pressure	See "Checking the inflation pressure"
	Reduction gear (if installed)	Check oil	See "Checking the oil level"

Dispose of the worn-out components and lubricants in accordance with the relevant statutory requirements.

Carry out the routine maintenance procedures specified by the manufacturer to keep the pump safe and performing well.



Table of lubricants

The pump is delivered complete with high-performance 30 weight, non-detergent oil suitable for the intended ambient conditions (see "Environmental operating limits").

Inspecting the pump mounting

Check that the pump's fixing screws have not become loose.

If necessary, tighten them with the driving torque stated in the installation design.

Inspecting the connections and pipes

- **Inspect the connections for leaks.**

Leaks can normally be dealt with by tightening the connections properly.

If leaks from the intake pipeline connections are noticed, the seals must be repaired.

- **Inspect the hoses.**

If the pipes show signs of aging, breakage, swelling, rubbing, etc., they must be replaced.

Inspecting the Inlet Filter

- **Inspect the inlet filter cartridge.**

If the cartridge is fouled, wash it thoroughly to remove the dirt.

If the cartridge is torn or cracked, it must be replaced.

Checking the oil level

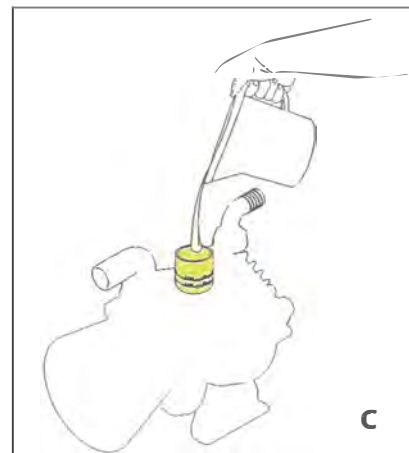
- Check the oil with the pump level, ensuring that it has been running for at least 5 minutes in normal working conditions.
- If the oil level is not visible or completely full, add or remove oil to restore this level and check, still with the pump running, that the oil level does not vary so much that it leaks from the cap or is no longer visible in the tank.
- If necessary, top up with oil with A/R Premium Diaphragm Pump oil P/N 64532D.
- Check the oil level regularly, as it may vary significantly with the operating conditions.

To top up with oil proceed as described below.

- 1) Unscrew the cap and pour in oil.
- 2) Screw the cap back into place.



A/R Pump Oil
P/N AR64532D





Pump Storage

It is important to comply with the recommendations for storage in the operator's manual of the machine into which the pump is incorporated.

For the pump itself, at the end of pumping operations it is essential to flush out the pump by pumping clean water. After this, open the pump inlet to air and leave the pump in operation until the pump is completely empty. Following this simple procedure at the end of every operating session will prevent the retention inside the pump of products which are often corrosive and may damage its wetted parts over the long-term.

If the pump is in storage during the winter in locations with severe weather conditions, it is very important to flush out the internal circuit as described above and then fill the pump with A/R Pump Saver, AR64511. Then take care to drain the liquid from the system and the pump.

Putting the pump back into service

Before putting the pump back into service after storage, check the oil level and the tightness of the mounting screws.

Scrapping the pump

Used units must be disposed of in compliance with local legislation.



A/R Pump Saver
P/N 64511
**Protects Pumps from
Freezing Conditions**



TROUBLESHOOTING



The information provided is intended to provide guidance how to deal with malfunctions which may occur during use.

Some of these procedures may be carried out by skilled staff, while others have to be performed at specialised service centres since they require the use of specific equipment as well as detailed knowledge of repair operations.

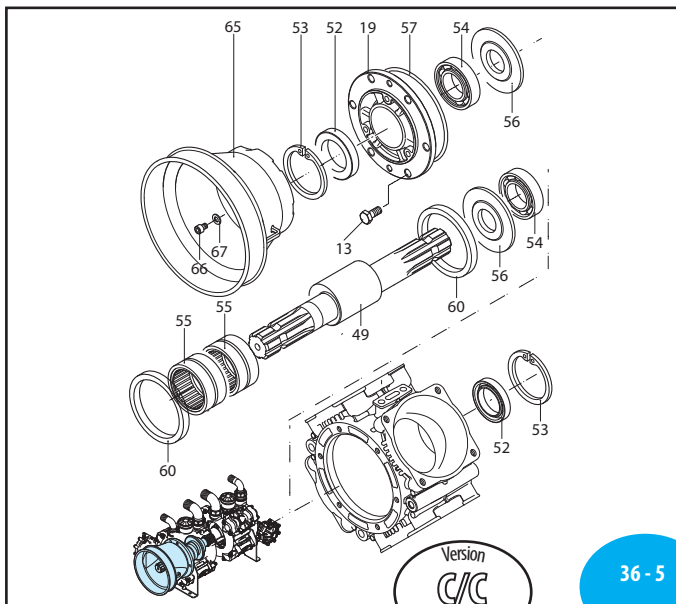
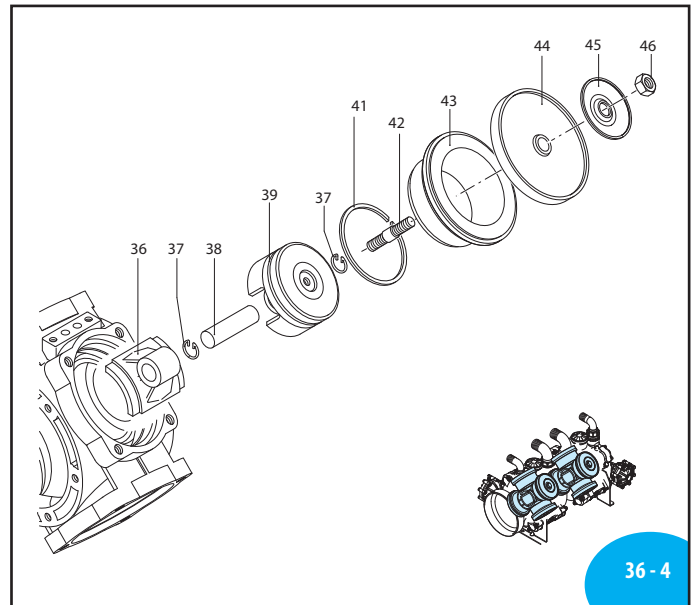
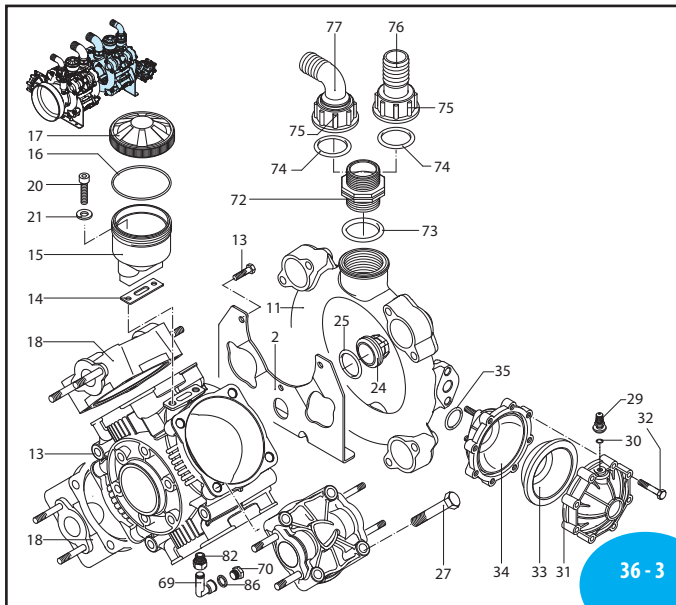
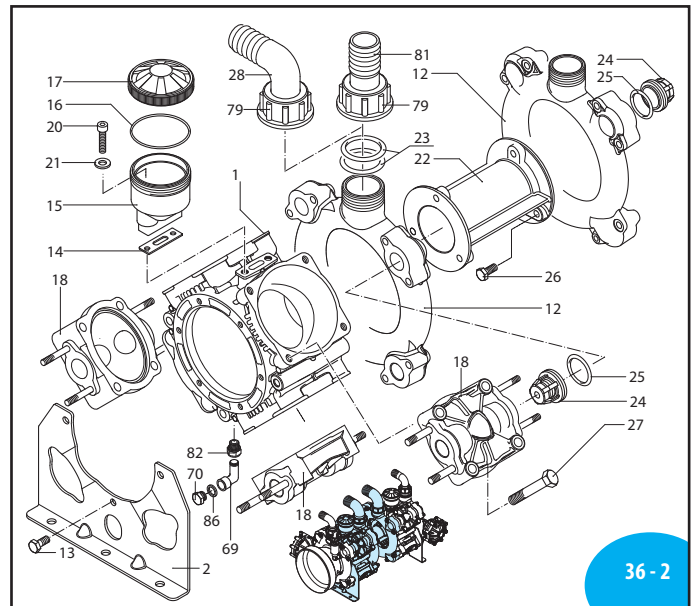
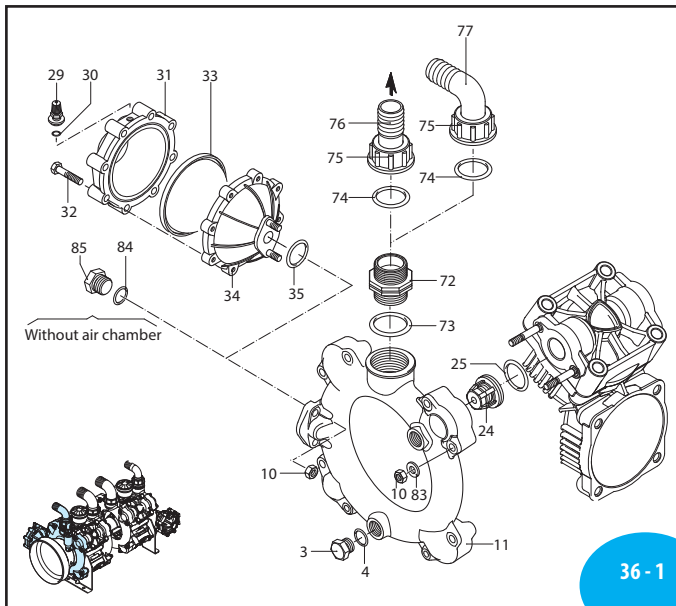
Problem	Cause	Remedy
The pump does not prime properly.	Intake circuit not airtight.	Tighten, repair or replace hoses and fittings as necessary.
	Control unit switching lever on "Pressure" setting.	Move control switching lever to "By-pass" setting.
The pump does not require the required pressure.	Seat and plate of intake and delivery valves worn.	Replace the worn valves.(1)
	Nozzles worn or too large in diameter.	Replace the worn nozzles. Use nozzles of suitable diameter.
	Restriction in intake circuit.	Remove the restriction from the circuit.
	Intake filter fouled.	Clean the filter cartridge.
Pressure gauge needle wobbles, pressure pulsating.	Intake circuit not airtight.	Clean or replace the intake and delivery valves. (1)
	Residual air left inside pump.	Discharge the air by opening a ball valve/central unit connected to the delivery side with the pump in operation.
	Valve plate stuck to its seat.	Tighten, repair or replace hoses and fittings as necessary.
	Pressure accumulator deflated	Inflate accumulator to the correct pressure.
Uneven flow of liquid to nozzles.	Pressure accumulator deflated	Inflate accumulator to the correct pressure.
Increase in noise and simultaneous drop in oil level (pump cavitation).	Restriction in intake circuit.	Remove the restriction from the circuit.
	Intake filter fouled.	Clean the filter cartridge.
	Pump drawing in liquid from too low a level.	See "Pump Intake Conditions" section.



TROUBLESHOOTING

Problem	Cause	Remedy
Oil on pump body or base.	Oil seal on pump shaft worn.	Replace the worn oil seal.
	Oil pressure inside pump too high.	Restore correct oil level in tank.
Pump using too much oil (oil flowing from delivery port) or oil whitish in color (water/oil emulsion in tank).	One or more diaphragms ruptured.	Stop the pump at once. Replace the diaphragms (1)

AR 320 bp TWIN TOP - AR 370 bp TWIN TOP



AR 320 bp TWIN TOP - AR 370 bp TWIN TOP

	C/C
AR320bp	31723
AR370bp	31724

Low pressure

Pos	Code	Description	Qty	Note
1	761010	Pump body	2	
2	761031	Base	2	
3	330173	Plug 1/2" G	2	Geomet T180*
3	330174	Plug 1/2" G	2	SS T180*
4	180101	O-ring 0 17.5x2	2	
10	380242	Nut M8	36	Geomet T180*
10	380244	Nut M8	36	SS T180*
11	760760	Manifold manifold	2	
12	760750	Manifold suction	2	
13	160672	Bolt TE M10x25	12	Geomet T355*
13	160673	Bolt TE M10x25	12	SS T355*
14	750040	Gasket	2	
15	750030	Oil sight glass	2	
16	1040060	O-ring 0 72.69x2.62	2	
17	1800060	Plug black	2	AR270bp
17	750050	Plug red	2	AR320bp
18	751350	Head	8	
18	751352	Head	8	SS
19	680020	Support	2	
20	680350	Bolt TCEI M8x35	4	T90*
21	380243	Washer	4	Geomet
22	751320	Flange	1	
23	3040470	O-ring 0 39.3x2.6	4	
24	759051	Valve	16	
25	680070	O-ring 0 31.5x4.25	16	
26	620321	Bolt TE M10x30	6	Geomet T445*
26	620322	Bolt TE M10x30	6	SS T445*
27	750061	Bolt TE M12x65	32	Geomet T445*
27	750062	Bolt TE M12x65	32	SS T445*
28	3040430	Elbow 1 1/2"	2	AR320bp
28	3040440	Elbow 2"	2	AR370bp
29	180020	Air valve	2	T25*
30	650542	Gasket	2	
31	620232	Semi air chamber upper	2	Black
32	621781	Bolt TE M8x40	16	Geomet T180*
32	621782	Bolt TE M8x40	16	SS T180*
33	550190	Diaphragm air chamber	2	NBR
33	550191	Diaphragm air chamber	2	Saturflon
33	550192	Diaphragm air chamber	2	Viton
33	550193	Diaphragm air chamber	2	HPDS
33	550194	Diaphragm air chamber	2	BlueFlex™
34	680180	Semi air chamber lower	2	
35	390290	O-ring 0 29x3	2	
36	760140	Connecting-rod	8	
37	160691	Ring circlip 0i 18	16	
38	160700	Pin	8	
39	750122	Piston 0 80	4	
41	500260	Piston ring	8	(a)
42	2240100	Hub pin	8	T310*
43	750115	Sleeve	8	AR370bp
43	750110	Sleeve	8	AR320bp

Pos	Code	Description	Qty	Note
44	550080	Diaphragm	8	NBR (b)
44	550085	Diaphragm	8	Desmopan
44	550084	Diaphragm	8	Viton
44	550086	Diaphragm	8	HPDS
44	550081	Diaphragm	8	BlueFlex™
45	751250	Retaining washer	8	
46	2240110	Nut M10	8	SS T265*
49	750170	Shaft marked AU	2	AR320bp
49	750174	Shaft marked AV	2	AR370bp
50	800750	Bolt M8x8	1	T90*
51	761040	Coupling 1 3/8(F)Z=6 45°	1	marked 4 (c)
52	160740	Ring seal	4	
53	200390	Ring circlip 0i 62	4	
54	751280	Bearing	4	
55	750090	Bearing	4	
56	540040	Retaining washer	4	
57	851360	O-ring 0 120.32x2.62	2	
58	230310	Bearing	1	
60	750130	Ring connecting rod	4	
61	760510	Retaining washer	1	
62	620330	Ring circlip 0i 65	1	
64	2420181	Support	1	
65	1500470	Shield	1	
66	850251	Bolt TCEI M8x12	6	Geomet
66	850252	Bolt TCEI M8x12	6	SS
67	390314	Washer	6	Geomet
67	390315	Washer	6	SS
68	650640	Bolt TCEI M10x25	6	Geomet T355*
68	650642	Bolt TCEI M10x25	6	SS T355*
69	900210	Fitting 3/8" G M-F	2	
70	2281270	Plug 3/8" G	2	T180*
71	160673	Bolt TE	3	SS T180*
72	751130	Fitting 1 1/2 G M-M	2	
73	751140	O-ring 0 47.22x3.53	2	
74	390290	O-ring 0 29x3	2	
75	750670	Ring nut 1 1/2" G	2	
77	751200	Elbow 1 1/4"	2	
79	3040450	Ring nut 2" G	2	
81	760950	Hose barb 040	2	Optional AR320bp
81	760570	Hose barb 050	2	Optional AR370bp
82	1040491	Fitting 3/8" M-F	2	
83	380243	Washer	32	Geomet
83	390315	Washer	32	SS
84	740290	O-ring 0 14x1.78	2	
85	880530	Plug 3/8" G	2	T180*
85	2340350	Plug 3/8" G	2	SS T180*
86	2260200	Washer	2	

* Torque: in-lbs +/- 10%



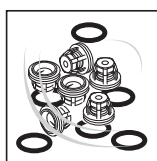
AR 43264
Buna diaphragms

AR 43266
Viton diaphragms

AR 43265
Desmopan diaphragms

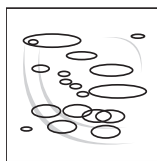
AR 43267
BlueFlex™ diaphragms

Pos.	Qty
25	16
33	2
44	8



AR 2374 (Qty 2)
Valves

Pos.	Qty
24	8
25	8



AR 42510 (Qty 2)
O-Rings

Pos.	Qty
4	1
8	1
16	1
23	2
25	8
30	1
35	1
57	1
73	1
74	1
85	2



Suggested oil

Type	Oz
AR64532D	32

Crankcase Oil
Capacity 90 oz

- (a) Bolt with Loctite 242 piston side.
(b) **ATTENTION !** Assemble with grease, between the Retaining washer and the diaphragm.
(c) **ATTENTION !** Before coupling spray D-321R on the outside of the pump shaft and the inside of the coupling. Leave to dry and then lubricate with grease.
ATTENTION ! Install the shafts with the marking and timing hole on the opposite side of the flange. To coincide the mark on the coupling with the timing hole of the shaft.

