



**ANNOVI
REVERBERI**®
The Power of Experience

AR 120 LFP AR 140 LFP

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



INSTRUCTION MANUAL

AR120LFP / AR140LFP - 550 RPM - SEMI-HYDRAULIC THREE-DIAPHRAGM PUMP

MODEL	MAX GPM	MAX L/MIN	MAX PSI	MAX BAR	HP POWER	WEIGHT LBS.
AR120LFP-C	30.8	116.7	220	15	4.5	34.4
AR120LFP-SP	30.8	116.7	220	15	4.5	34.4
AR120LFP-AP-SP/C	30.8	116.7	220	15	4.5	34.4
AR140LFP-C	35.1	132.9	220	15	5.2	34.4
AR140LFP-SP	35.1	132.9	220	15	5.2	34.4
AR140LFP-AP-SP/C	35.1	132.9	220	15	5.2	34.4

DIAPHRAGM KITS

MODEL	DESCRIPTION
AR43255	BlueFlex
AR43253	Desmopan
AR43252	NBR
AR43254	Viton

VALVE KITS

MODEL	DESCRIPTION
AR43138	Valves

O-RING KITS

MODEL	DESCRIPTION
AR43139	O-Rings

OIL

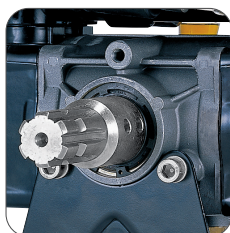
MODEL	
AR64532D	Oil
AR64532D-C	Case (6)Oil



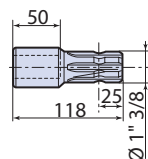
Application Kits

Low Pressure

Shaft Kit AR43392: 1 3/8" Male Spline Shaft



1" 3/8 universal shaft

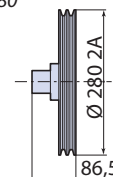


For Models: AR70, AR115 & AR135

Pulley Kit AR31058



Pulley 2A 11" Diameter
For AR45, AR80

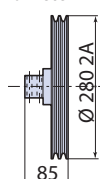


Pulley Kit AR1514

\$281.40



Pulley 2A 11" Diameter



For Models: AR70, AR115 & AR135

Hydraulic Motor Flange Kit AR55371



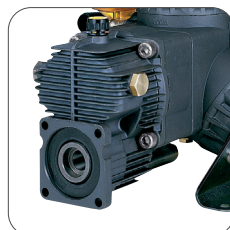
For models AR410 - 460
Fits 4 Bolt B Flange Motors with
32mm Shaft

Hydraulic Motor Flange Kit AR1570

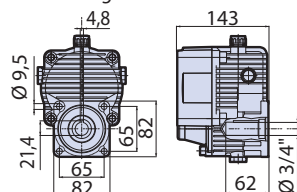


For models AR160 - 370
Fits SAE 2-bolt A Flange Motors with
1" Shaft

Gearbox Kit 3/4": for 5-6 HP Gas Engine



Gearbox for four stroke engines
with SAE J609a flange



AR1671 For Models: AR70, AR115 & AR135

AR31185 For Models: AR45, AR60 & AR80

Hydraulic Motor Flange Kit AR2495



For models AR70, AR115, AR135
(SP Models Only)
Fits SAE 2-bolt A Flange Motors with
1" Shaft

Hydraulic Motor Flange Kit AR55384



For models AR330, AR380,
AR410 & AR460 Pumps

Hydraulic Motor Flange Kit AR55375



For models AR45, AR60 & AR80
(SP Models Only)
Fits SAE 2-bolt A Flange Motors with
1" Shaft

Shaft Kit AR43389: 1" Male Solid Keyed Shaft



For models AR70, AR115 & AR135
Kit includes a male PTO shaft adapter,
mounting bracket and necessary
hardware.

Hydraulic Motor Flange Kit AR55376



For models AR120, AR140
(SP Models Only)
Fits SAE 2-bolt A Flange Motors with
1" Shaft

The part numbers refer to the application kit only, excluding the pump. The applications should be used only with the proper protective equipment for the safety of the operator.



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



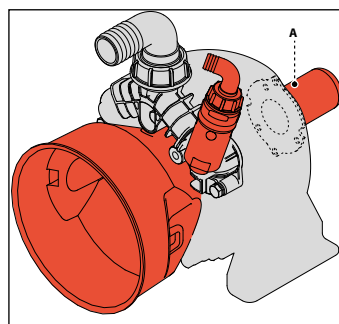
Danger - Warning

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

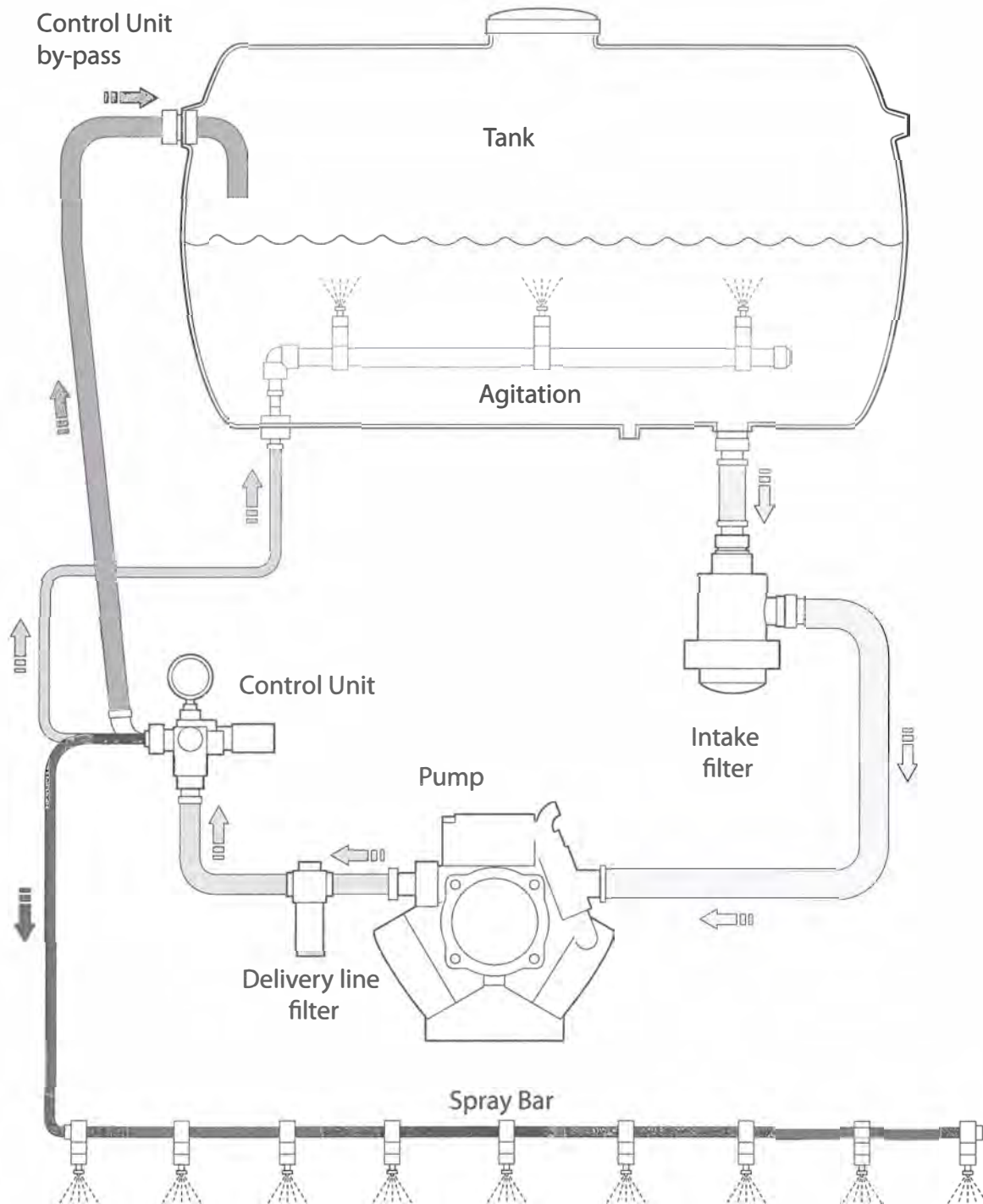
Even if the safety regulations and information provided in the manual are complied with, the residual risks described in the declaration of incorporation still apply when the pump is in operation.



INSTALLATION INSTRUCTIONS

Installation diagram (guideline)

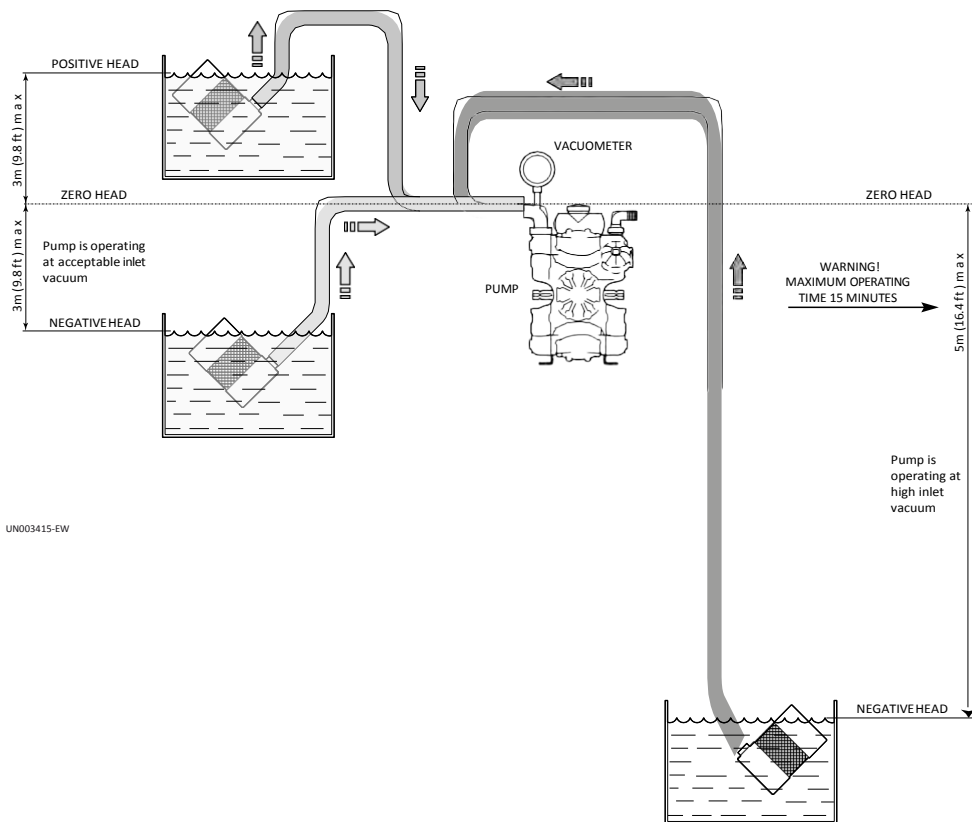
The following is a simplified illustration of the typical installation layout and is purely a guideline.



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 3m.



For continuous duty, the pump should not draw in liquids by vacuum from containers with the liquid level more than 3m 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 5m below the pump intake fitting, for periods of no more than 15minutes.

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.



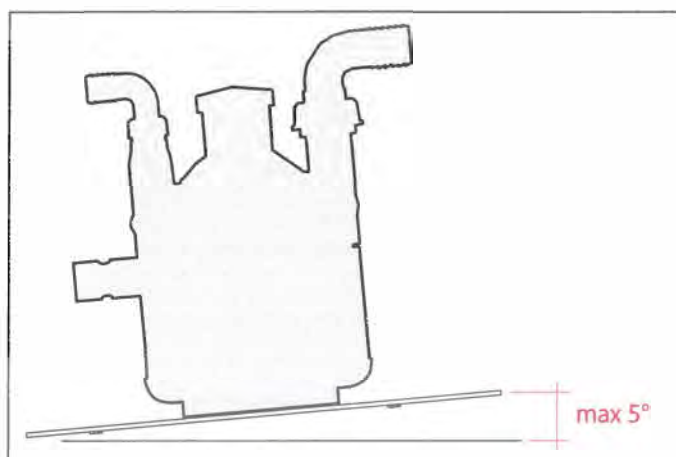
Installation

- 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 adjusting the control unit into 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

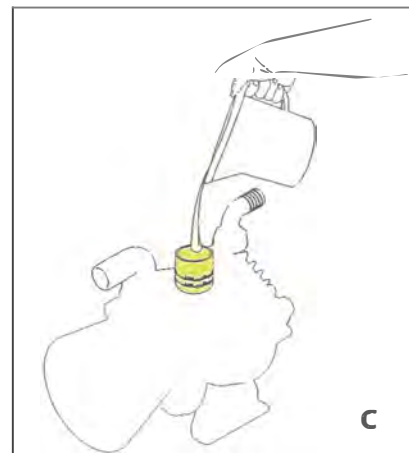
- Check the oil with the pump level, ensuring that it has been running for at least 5 minutes in normal working conditions.
- If the oil level is not visible or completely full, add or remove oil to restore this level and check, still with the pump running, that the oil level does not vary so much that 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.

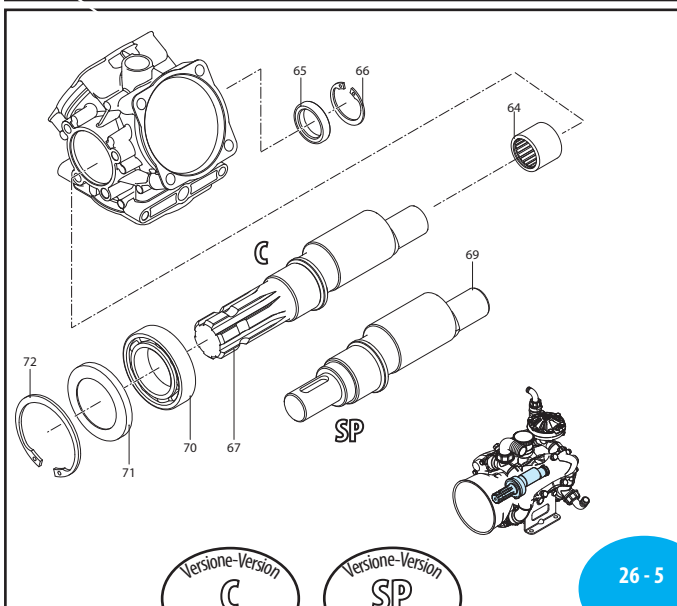
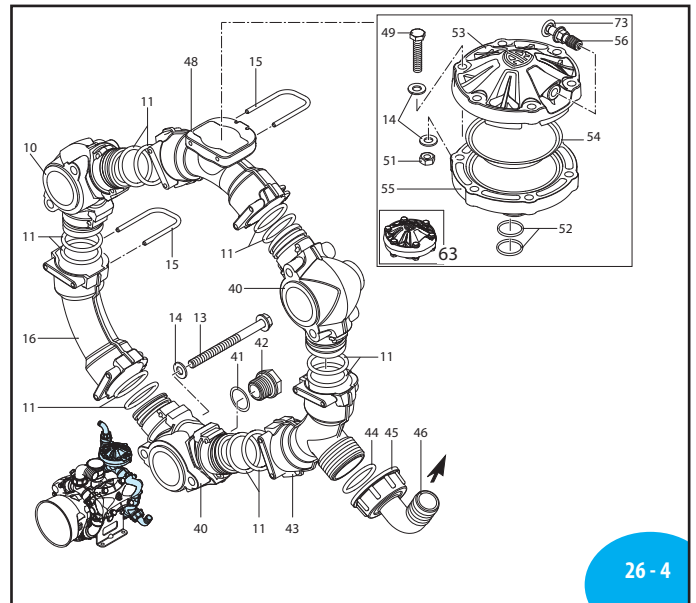
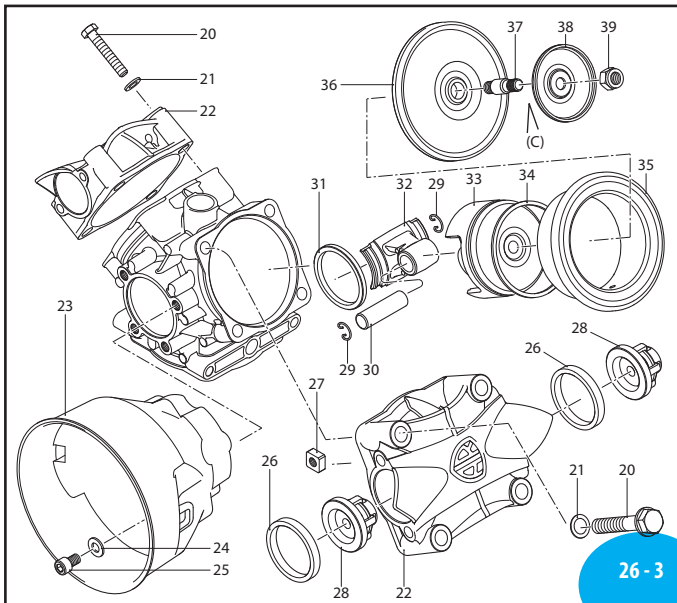
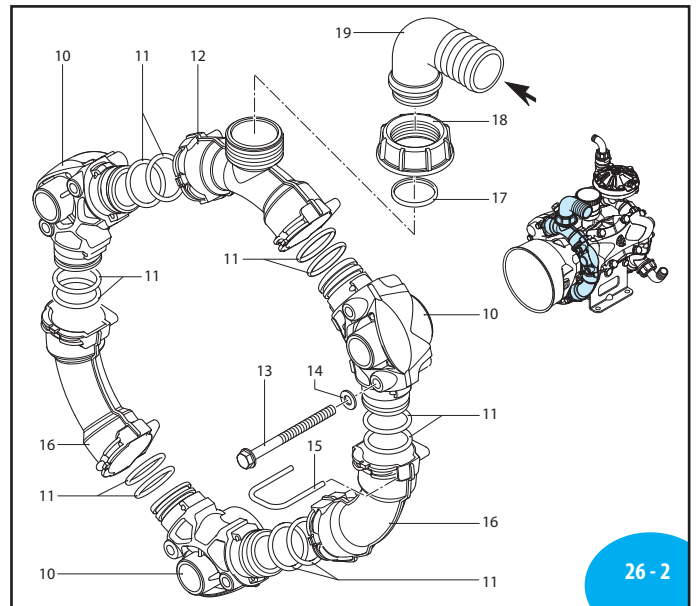
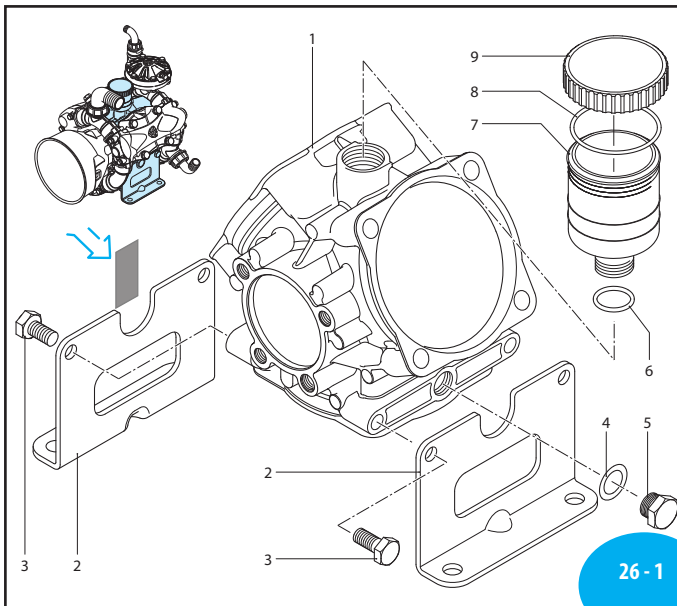
Problem	Cause	Remedy
The pump does not prime properly.	Intake circuit not airtight.	Tighten, repair or replace hoses and fittings as necessary.
	Control unit switching lever on "Pressure" setting.	Move control switching lever to "By-pass" setting.
The pump does not require the required pressure.	Seat 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)

AR120LFP - AR 120 bp / AR140LFP - AR 140 bp



AR120LFP - AR 120 bp / AR140LFP - AR 140 bp

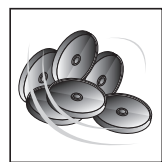
	C	SP	AP-SP/C
AR120LFP	32019	33090	32021
AR120bp	31710	31711	
AR140LFP	32029	33091	32031
AR140bp	31712	31713	

Low pressure

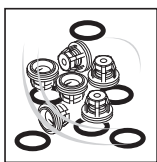
Pos	Code	Description	Qty	Note
1	3460010	Pump body	1	
2	3460100	Base	2	Cataphoresis
3	160672	Bolt TE M10x25	4	Geomet T265*
3	160673	Bolt TE M10x25	4	SS T265* LFP
4	740290	O-ring Ø 14x1.78	1	
5	880530	Plug 3/8" G	1	T180*
6	720030	O-ring Ø 22.22x2.62	1	
7	3120240	Oil sight glass	1	T180*
8	650920	O-ring Ø 53.65x2.62	1	
9	1040326	Plug black	1	AR 120bp
9	1040324	Plug red	1	AR 140bp
10	3460030	Manifold	4	
11	2680140	O-ring Ø 32.93x3.53	24	
11	2680141	O-ring Ø 32.93x3.53	24	Viton LFP
12	3460050	Manifold suction	1	
13	3460200	Bolt TE M8x100	12	Geomet T105*
13	3460201	Bolt TE M8x100	12	SS T105* LFP
14	390314	Washer	24	Geomet
14	390315	Washer	24	SS LFP
15	3460210	Fork	13	
16	3460040	Manifold	3	
17	390290	O-ring Ø 29x3	1	
17	1880460	O-ring Ø 29x3	1	Viton LFP
18	750670	Ring nut 1 1/2" G	1	
19	50267	Elbow 1 1/2"	1	
20	750071	Bolt TE M12x70	12	Geomet T310*
20	750072	Bolt TE M12x70	12	SS T310* LFP
21	390090	Washer	12	Geomet
21	390092	Washer	12	SS LFP
22	3460020	Head	3	
23	3240290	Shield	2	
24	320621	Washer	4	Geomet
24	320622	Washer	4	SS LFP
25	820673	Bolt TCEI M10x16	4	Geomet T90*
25	820672	Bolt TCEI M10x16	4	SS T90* LFP
26	3460240	Gasket	6	
26	3460380	Gasket	6	Viton LFP
27	3120511	Nut M8	12	Geomet
27	3120510	Nut M8	12	SS LFP
28	2429050	Valve	6	
28	2429051	Valve AISI 316L	6	LFP
29	380080	Ring circlip Øi 14	6	
30	380300	Pin	3	
31	3460090	Ring connecting rod	2	
32	3460080	Connecting-rod	3	
33	580120	Piston Ø 80	3	
34	500260	Piston ring	3	
35	750117	Sleeve	3	AR 120bp
35	750110	Sleeve	3	AR 140bp
36	550080	Diaphragm	3	NBR
36	550081	Diaphragm	3	BlueFlex
36	550084	Diaphragm	3	Viton
36	550085	Diaphragm	3	Desmopan
36	550086	Diaphragm	3	HPDS
37	2240100	Hub pin	3	T265* (a)
37	2240101	Hub pin	3	T265* LFP
38	580090	Retaining washer	3	
38	75047	Sleeve	1	AR120
39	2240110	Nut M10 SS	3	T220*
39	2240670	Nut M10 AISI 316L	3	T220* LFP

Pos	Code	Description	Qty	Note
40	3460031	Manifold	2	
41	1140450	O-ring Ø 20.24x2.62	1	
41	1140451	O-ring Ø 20.24x2.62	1	Viton LFP
42	3460220	Plug 1/2" G	1	T90*
43	3460060	Manifold manifold	1	
44	550040	O-ring Ø 26.62x2.62	1	
44	880311	O-ring Ø 26.62x2.62	1	Viton LFP
45	651100	Ring nut 1" 1/4 G	1	
46	651460	Elbow 1"	1	
48	3460070	Manifold	1	
49	621781	Bolt TE M8x40	6	Geomet T180*
49	621782	Bolt TE M8x40	6	SS T180* LFP
51	380242	Nut M8	6	Geomet T180*
51	3120260	Nut M8	6	
52	550040	O-ring Ø 26.62x2.62	2	
52	880311	O-ring Ø 26.62x2.62	2	Viton LFP
53	3460190	Semi air chamber upper	1	Nylon
54	800190	Diaphragm air chamber	1	NBR
54	800192	Diaphragm air chamber	1	BlueFlex
55	3460180	Semi air chamber lower	1	Nylon
56	180020	Air valve	1	T220*
63	1505	Air chamber	1	NBR
63	43067	Air chamber	1	BlueFlex
64	3460110	Bearing	1	
65	1300230	Ring seal	1	
66	480900	Ring circlip Øi 35	1	
67	3460160	Shaft marked DT	1	AR 120bp / LFP C
67	3460170	Shaft marked DQ	1	AR 140bp / LFP C
67	3460250	Shaft marked DU	1	AR 120bp / LFP SP
67	3460260	Shaft marked DV	1	AR 140bp / LFP SP
67	346025	Shaft marked DU	1	AR 120
70	961781	Bearing	1	
71	3120160	Ring seal	1	
72	961790	Ring circlip Øi 68	1	
73	650542	Gasket	1	
74	650250	Key	1	
75	650300	Coupling	1	
76	961340	Washer	1	
77	680350	Bolt TCEI M8x35	1	T90*
78	1200521	Spacer	3	
79	380241	Washer	3	
79	392110	Washer	3	SS LFP
80	680350	Bolt TCEI M8x35	3	T90*
80	680351	Bolt TCEI M8x35	3	SS T90* LFP
81	651350	Gasket	1	
82	3469002	Complete Inlet assembly	1	AR120bp

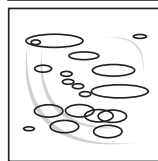
- (a) Bolt Shank piston side with Loctite 242 Strong threadlock (Green) and lubricate the shank side Retaining washer with Molykote grease 1000.
 (b) Bolt the valve until it bottoms on the elbow.
 (c) Attention! Assemble with grease between the Retaining washer and the membrane.
 * Torque: in-lbs +/- 10%



AR 43252 NBR diaphragms	
AR 43255 BlueFlex diaphragms	
AR 43253 Desmopan diaphragms	
AR 43254 Viton diaphragms	
Pos.	Qty
26	6
36	3
52	2
54	1



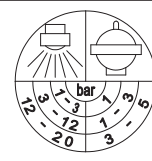
AR 42805 Valves	
AR 43138 LFP Valves	
Pos.	Qty
26	6
28	6



AR 42830 O-Rings			
AR 43139 LFP O-Rings			
Pos.	Qty	Pos.	Qty
4	1	44	1
6	1	52	2
8	1	59	1
11	24	61	1
17	1	81	1
41	1		



Suggested oil	
Type	Oz
AR64532D	32
Crankcase Oil Capacity 28 oz	



2154700 Air chamber decal

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Pump and manufacturer identification.