CONTENTS

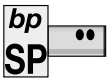
English

KEY TO VERSIONS

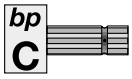
VRI
Built- in regulating valve

S.G.C.
Without control unit

SP
Pump only with base



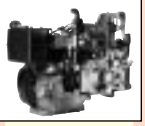
C
Universal shaft 1"3/8



CR
With gearunit

CRxS
Model with 1:5, 9 reduction gear for four-stroke engines

S
Flanged to petrol engine



SD
Flanged to diesel engine

DC
Coupled to D.C. electric motor

EM
Flanged to single-phase electricmotor

ET
Flanged to three-phase electric motor

C.A.
Air chamber

SP
Pump only

AP
Through shaft

C/SP
Universal shaft 1"3/8 - Pump only

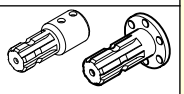
C/C
Universal shaft 1"3/8-Universal shaft 1"3/8

C/F
Universal shaft 1"3/8 - Female 1"3/8

C/F Ø 25, Ø 32
Universal shaft 1"3/8 - Female Ø 25, Ø 32

APPLICATION KIT

C
Universal shaft 1"3/8

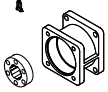


F
Female 1"3/8

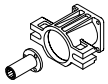
P
Pulley

T
Quick coupling for standardized tractor PTO

FT
Flange for tractors

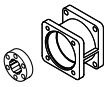


FM
Flanged for motor-cultivators, motor-hoes

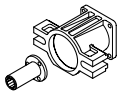


FD
Flange for BIMA, COMER, FIENI and GB overgears

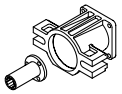
FDG
Flange for BIMA, COMER, FIENI and GB overgears



IDM
Flanged for hydraulic motors



IDP
Flange for hydraulic pumps



English

BASIC PUMP VERSIONS AND CONTROL UNIT

PLASTIC-COATED LOW PRESSURE SPRAYING DIAPHRAGM PUMPS WITH DACROMET NUTS AND BOLTS

TYPE	N° of diaph.	DELIVERY		PRESSURE		POWER	R.P.M.	WEIGHT	Suction	Outlet	C.A.
		L/min	gpm	bar	psi	HP		kg	mm	mm	
AR 115 bp/1000	3	94	25	15	220	4.3	1000	13	Ø 40	Ø 25	●
AR 70 bp	2	72	19	20	290	3.4	550	9,5	Ø 30	Ø 25	●
AR 115 bp	3	114	30.1	20	290	5.5	550	13	Ø 40	Ø 25	●
AR 135 bp	3	132	34.9	20	290	6.7	550	14	Ø 40	Ø 25	●
AR 125 bp	3	122	32	20	290	5.7	550	21	Ø 40	Ø 25	●
AR 145 bp	3	142	37.5	20	290	7	550	21	Ø 40	Ø 25	●
AR 160 bp	4	161	42.5	20	290	7.4	550	28	Ø 40	Ø 25	●
AR 185 bp	4	180	47.6	20	290	8.2	550	28	Ø 50	Ø 35	●
AR 215 bp	6	215	56.8	20	290	11	550	36	Ø 50	Ø 35	●
AR 250 bp	6	250	66.1	20	290	11.5	550	36	Ø 50	Ø 35	●
AR 280 bp	6	282	74.5	20	290	12.9	550	36	Ø 60	Ø 35	●
AR 320 bp	8	321	85	20	290	16.8	550	58	1 x Ø 60	2 x Ø 35	(2 x) ●
AR 370 bp TWIN	8	371	98	20	290	17.3	550	58	1 x Ø 60	2 x Ø 35	(2 x) ●
AR 500 bp TWIN	12	500	132.2	20	290	23	550	75	2 x Ø 50	2 x Ø 35	(2 x) ●
AR 560 bp TWIN	12	560	149	20	290	25.8	550	75	2 x Ø 60	2 x Ø 35	(2 x) ●

● = Supplied as standard

ANODIZED AND PLASTIC-COATED MEDIUM PRESSURE DIAPHRAGM PUMPS FOR GARDENING

TYPE	N° of diaph.	DELIVERY		PRESSURE		POWER	R.P.M.	WEIGHT	Suction	Outlet	V.R.I.	C.A.
		L/min	gpm	bar	psi	HP		kg	mm	mm		
AR DUE	2	13	3.5	20	290	0.6	1450	2,1	Ø 20	2 x Ø 8	●	●
AR 202	2	20	5.3	20	290	0.7	650	4	Ø 20	2 x Ø 8	●	●
AR 252	2	25	6.6	25	362	1.6	650	4	Ø 20	Ø 13	◆	●
AR 30	2	35	9.3	40	580	3.2	550	11	Ø 25	Ø 13	◆	●
AR 50	2	52	13.7	40	580	5	550	17,5	Ø 30	Ø 13	◆	●

◆ = Supplied as separate item
● = Supplied as standard

ANODIZED MEDIUM AND HIGH PRESSURE DIAPHRAGM PUMPS

TYPE	N° of diaph.	DELIVERY		PRESSURE		POWER	R.P.M.	WEIGHT	Suction	Outlet	Valves	C.A.
		L/min	gpm	bar	psi	HP		kg	mm	mm	N° / mm	
AR 303	3	30	7.9	40	580	2.4	550	9,5	Ø 25	Ø 13	-	-
AR 403	3	40	10.6	40	580	3.8	550	9,5	Ø 25	Ø 13	-	-
AR 503	3	55	14.5	40	580	5.2	550	13	Ø 30	Ø 3/4"G(M)	1 x Ø 10	-
AR 713	3	71	18.7	40	580	8.6	550	20	Ø 40	Ø 3/4"G(M)	1 x Ø 10	●
AR 813	3	81	21.4	50	725	9.9	550	20	Ø 40	Ø 3/4"G(M)	1 x Ø 10	●
AR 1064	4	105	27.7	50	725	13.1	550	22	Ø 40	Ø 3/4"G(M)	2 x Ø 10	●
AR 1265	5	126	33.3	50	725	15.6	550	29	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●
AR 1516	6	151	39.9	50	725	18.6	550	34	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●

● = Supplied as standard

BASIC PUMP VERSIONS AND CONTROL UNIT

English

ANODIZED HIGH PRESSURE DIAPHRAGM PUMPS

TYPE	N° of diaph.	DELIVERY		PRESSURE		POWER	R.P.M.	WEIGHT	Suction	Outlet	Valves	C.A.
		L/min	gpm	bar	psi	HP		kg	mm	mm	N° / mm	
AR 1254	4	130	34.3	50	725	16.3	550	41	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●
AR 1554	4	155	40.9	50	725	19.6	550	54	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●

● = Supplied as standard

ANODIZED HIGH PRESSURE DIAPHRAGM PUMPS

TYPE	N° of diaph.	DELIVERY		PRESSURE		POWER	R.P.M.	WEIGHT	Suction	Outlet	Valves	C.A.
		L/min	gpm	bar	psi	HP		kg	mm	mm	N° / mm	
BHA 110	3	113,5	30	50	725	12.9	550	40	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●
BHA 140	3	142,3	37.6	50	725	17.1	550	40	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●
BHA 160	4	150,6	39.8	50	725	17.6	550	51	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●
BHA 200	4	193,7	51.2	50	725	21.8	550	51	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●

● = Supplied as standard

HIGH PRESSURE DIAPHRAGM PUMPS WITH BRASS MANIFOLDS AND HEADS

TYPE	N° of diaph.	DELIVERY		PRESSURE		POWER	R.P.M.	WEIGHT	Suction	Outlet	Valves	C.A.
		L/min	gpm	bar	psi	HP		kg	mm	mm	N° / mm	
BHS 110	3	113,5	30	50	725	12.9	550	52	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●
BHS 140	3	142,3	37.6	50	725	17.1	550	52	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●
BHS 160	4	150,6	39.8	50	725	17.6	550	65	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●
BHS 200	4	193,7	51.2	50	725	21.8	550	65	Ø 40	Ø 3/4"G(M)	2 x Ø 13	●

● = Supplied as standard

HIGH PRESSURE PISTONS PUMPS C/W HYDRAULIC ENGINE FOR SELF-PROPELLED MACHINES' CLEANING

TYPE	N° PISTON	DELIVERY		PRESSURE		POWER	R.P.M.	WEIGHT
		L/min	gpm	bar	psi	HP		kg
HYD-XJS 11.14	3	11	2.90	140	2000	4	2800	13
HYD-XM 15.15	3	15	3.96	150	2200	5.5	1450	17
HYD-RK 15.20	3	15	3.96	200	2900	7.5	1450	19
HYD-XW 30.10	3	30	7.92	100	1450	7.5	1450	26

REMOTE CONTROL UNITS FOR LOW PRESSURE PUMPS

TYPE	MAX FLOW	MAX PRESSURE	Inlet	Return	Outlet	Valves
	L/min gpm	bar psi	Ø mm	Ø mm	Ø mm	N°
ECM	160 42.3	20 290	25	25	12 (10/20 Opt)	2-4-6
UCM	160 42.3	20 290	25	25	12 (10/20 Opt)	2-4-6
IDROMINUS	160 42.3	20 290	25	25	12 (10/20 Opt)	4-5-6
IDROCOSTANT - M	280 74	20 290	35	35	12 (10/20 Opt)	4-5-6 7-8
GS 20 S	80 21.1	20 290	20	18	10	3
RM 20 S	115 30.4	20 290	25	25	10	3
VDR 20 S	135 35.7	20 290	25	25	10	4

CONTROL UNITS FOR MEDIUM AND HIGH PRESSURE PUMPS

TYPE	MAX FLOW	MAX PRESSURE	Inlet	Return	Outlet	Valves
	L/min / gpm	bar / psi	Ø mm	Ø mm	Ø mm	N°
VR 20 S	25 5.7	20 290	13	16	8	1
GR 20 S	40 10.6	20 290	13	18	10	2 (+1)
GR 30	40 10.6	25 360	13	18	10	1 (+2)
GR 40	40 10.6	40 580	13	18	10	2 (+1)
GI 40	80 21.1	40 580	13	18	10	2 (+1)
GH 50	200 52.8	50 725	3/4"G	25	13	(2)
RM 40	90 23.8	40 580	3/4"G	18	10	2 (+1)
VDR 50	130 34.3	50 725	3/4"G	25	10	2 (+2)
BY MATIC 50	200 52.8	50 725	3/4"G	25	13	2 (+2)
BMH50	200 52.8	50 725	3/4"G	28	13	2

All pumps, motor driven pumps and electric pumps comply with the machines directive 98/37/EEC. CE

INTRODUCTION

The range of *Annovi Reverberi* piston-diaphragm pumps is used for delivery capacities from 13 l/min to 560 l/min with pressures from 0 to 50 bar.

The diaphragm pumps are characterized by an arrangement of radial pistons which actuate the diaphragms through an oil cushion, and for this reason they are defined as hydraulic or semi-hydraulic, depending on the piston-diaphragm coupling.

The pump is a medium-precision mechanical assembly, and as such constitutes a valuable component of the treatment system, and requires adequate care.

The pressure generated by the pump depends on the nozzle cross-section multiplied by the number used, and is regulated by a control unit (distributor) (* see page 45).

REFERENCE STANDARDS FOR THE Annovi Reverberi PRODUCT RANGE

GARDENING PUMPS

- EC Directive 98/37 "Machine Directives"
- EC Directive 73/23 "Low Voltage"
- EC Directive 89/336 "Electromagnetic Compatibility"
- EC Directive 2000/14 "Noise Emission"
- EN 907 "Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors - Safety"
- pr EN12761 - 1 "Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors - Part 1: General".
- pr EN 12761 - 2 "Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors - Environmental protection - Part 2: Full-field sprayers".
- pr EN 12761 - 3 "Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors - Part 3: Air-blast sprayers."

PUMPS FOR AGRICULTURE, MOTOR-DRIVEN PUMPS AND ELECTRIC PUMP ASSEMBLIES

- EC Directive 98/37 "Machine Directives"
- EC Directive 73/23 "Low Voltage"
- EC Directive 89/336 "Electromagnetic Compatibility"
- EC Directive 2000/14 "Noise Emission"
- EN 907 "Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors- Safety"
- pr EN12761 - 1 "Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors- Part 1: General".
- pr EN 12761 - 2 "Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors - Environmental protection - Part 2: Full-field sprayers".
- pr EN 12761 - 3 "Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors - Part 3: Air-blast sprayers."

SAFETY STANDARDS

The medium and high pressure sprayer ranges are fitted as standard with a safety valve which conforms to EC regulations.

Do not direct the pressurized jet at persons or animals. If powered by an electric motor, the machine must be equipped with a safety circuit which protects the operator against contact with high voltages.

If powered by an internal combustion engine, do not run the engine in enclosed areas; the exhaust gases contain carbon monoxide, an odourless but lethal gas.

INSTALLATION

A) Fix the pump on a support of adequate size and thickness, taking care to anchor the base using rigid fixing screws.

B) All *Annovi Reverberi* pumps are fitted as standard with an outlet safety valve which conforms to EC regulations, with a return line into the tank (connect a hose to its hose tail and place it inside the tank). This component, patented by *Annovi Reverberi*, causes the valve to open in the presence of excessive force and return the liquid to the tank; to re-arm the safety valve press the button as shown in fig. 1.

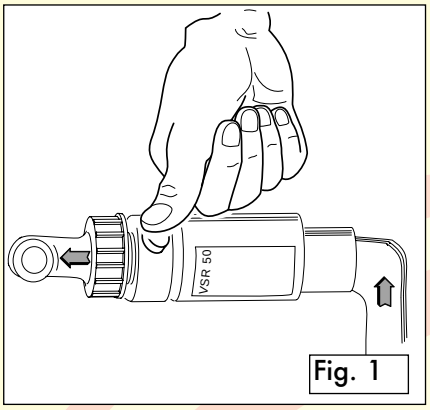


Fig. 1

C) The pump should work in optimal conditions. To ensure correct operation of the pump over time, use a suction hose with a diameter no smaller than that of the inlet fitting. The delivery capacity is measured in l/min (litres per minute); the speed at which the fluid passes through a section of the hose is measured in m/sec (metres per second). Obviously a given delivery capacity in l/min will pass through a large hose more slowly than through a narrower hose; in other words, the narrower the hose diameter, the greater the speed. An excessively high speed gives rise to flow resistance in the suction line. If this resistance is high, the pump may operate with cavitation, resulting in malfunction, noisiness and reduced component life, ultimately leading to premature breakages. The flow inside the pump suction line can be checked by performing a very simple test: connect a vacuometer close to the inlet port, as shown in the figure below.

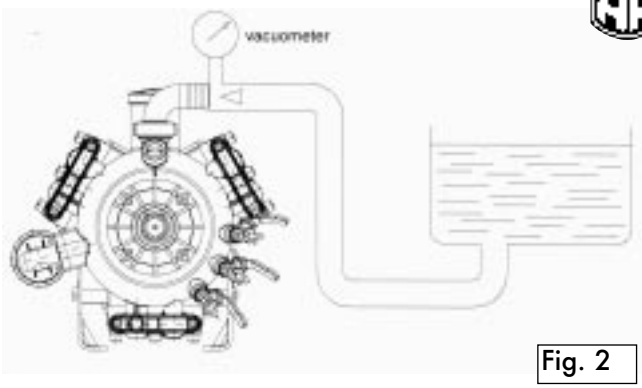


Fig. 2

When the pump is operating at its maximum rpm speed, the maximum measured suction pressure should be 0.3 bar. If this value is exceeded, the inlet line must be modified, by removing or widening the bottlenecks which are causing the flow resistance, until the desired pressure is obtained.

D) Use outlet hoses suitable to the pump's working pressure.

E) Fit the pump supply with a filter of adequate capacity (at least twice the delivery capacity of the pump) and sufficient filtering area.

F) All *Annovi Reverberi* pumps are equipped with the shaft guard in versions C/C, C/F, C/SP.

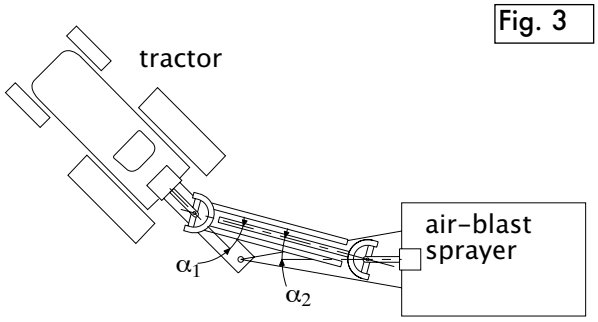
CHECKS PRIOR TO OPERATION

- With the pump off and placed on a flat surface, check that the oil level lies between the minimum and maximum indices; repeat the level check with the pump in operation.
- Always avoid bottlenecks and air suction which may compromise the correct operation of the pump.
- Check the state of wear of the inlet and outlet filters.
- Ensure that the by-pass return hose of the pressure regulating valve and the mixers are not positioned close to the suction hose, or in any case that no turbulence is created in the suction area of the tank.
- Check the air pressure in the air-chamber accumu-

lator; it should be one tenth of the working pressure, e.g. 50 bar working pressure = 5 bar accumulator pressure.

• Make sure that the pump speed is between 400 and 550 rpm.

Fig. 3



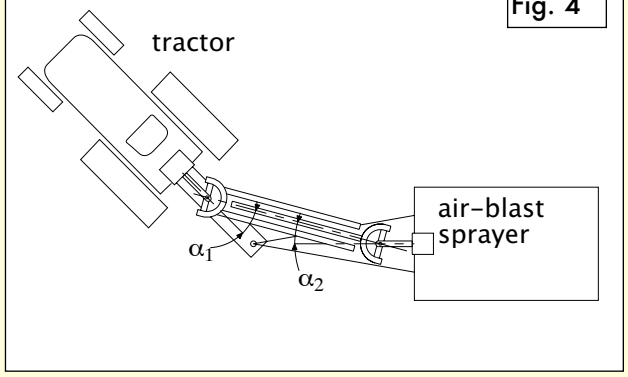
SELECTION AND APPLICATION OF CARDAN SHAFTS

When a cardan shaft operates with its two articulated joints at different angles, its movement is irregular.
Such irregular movement is absent when the difference between the two angles is zero, that is to say $\alpha 1 = \alpha 2$.
For correct assessment of the type of cardan shaft and its application, it is necessary to consult the specifications published by the manufacturers of the shafts themselves, but we can distinguish between two cases:

1) the shaft is to be used only for driving the pump:
1.1 greater differences between the two joint angles, and hence a certain irregularity in movement, may be acceptable, as illustrated in the specialist catalogues.

2) the pump is to transmit the movement of the cardan shaft to other mechanical devices via its own through shaft, e.g. a fan driven by an overgear unit, and which therefore rotates at high speed.
2.2 the inertial masses involved in the motion may be considerable, consequently the system can tolerate only slight variations in rotational speed; if these variations are too great, they will exert considerable twisting stresses which can cause wear and breakage of the various mechanical components, as well as significantly reducing the machine's life.
In this situation it is therefore necessary to strictly adhere to the following:

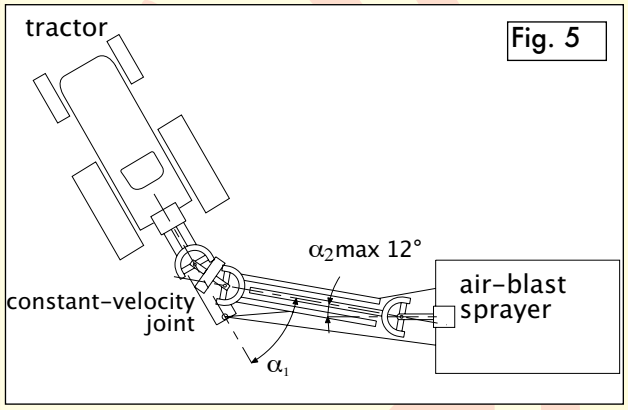
Fig. 4



a) a shaft with two simple joints can only be used when the drawbar pivot is equidistant between the cardan joints, or at worst when the difference between the angles $\alpha 1$ and $\alpha 2$ does not exceed 12°;

b) if the drawbar pivot is situated near one of the two joints, it is necessary to use a shaft with one constant-velocity joint and one simple joint. The constant-velocity joint must be connected to the power takeoff nearest to the drawbar pivot and, in this case too, the angle of the simple joint (a) must never exceed 12° in the worst-case position. In cases where angles greater than 12° can occur on the simple cardan joint, it is necessary to use a shaft with two constant-velocity joints.

Fig. 5



In operation during turns, the cardan shafts exert an axial thrust upon the eccentric shafts to which they are connected.
These stresses may cause breakage of certain pump components. Therefore, to keep them within acceptable limits, both the joints and the telescop-

English

ing shafts must always be well lubricated, in accordance with the manufacturer's instructions.
In addition, at the maximum turning angle the shaft must never reach the fully closed condition, i.e. its minimum length, because this will certainly result in breakage of its components.
To minimize axial stresses, there are shafts available on the market with Rilsan-coated telescoping tubes, and other new-generation products with special multiple-lobe sections, which can reduce the axial loads generated during telescoping by one half.
For further information consult the manufacturers.

ADJUSTMENTS

A precise adjustment is essential to effective treatment, and requires repeated trials and verifications, as set out below:

- Measure the actual forward speed of the machine when working.
- Calculate the delivery capacity of the nozzles.
- Verify the type of nozzle.
- Measure the real delivery capacity for distribution and return to the tank under the working conditions.
- Finally, adjust the actual delivery capacity until it matches the required value.

MEASURING THE WORK RATE

Proceed as follows to determine the work speed (V):

- Measure out a test distance on the field using a tape measure, and mark its two endpoints.

- Drive the tractor along the line between the two marks, in the chosen gear and at the motor speed corresponding to the chosen power takeoff rpm; carefully measure the time (t) taken to cover the test distance (L).

The simple formula for calculating the effective ground speed is:

$$V = \frac{3.6 \times L}{t}$$

For example if the distance is 100 metres and the time taken to cover it was 50 seconds:

$$V = \frac{3.6 \times 100}{50} = 7.2 \text{ Km/hour}$$

The delivery capacity of the jets is given by:

$$D = \frac{Q \times V \times L}{600}$$

If the target application rate is 250 litres per hectare using a 12 MT boom at a work speed of 7.2 Km/hour, the delivery capacity of the jets will need to be (note that this is the total capacity):

$$D = \frac{250 \times 7.2 \times 12}{600} = 36 \text{ Lt/Min}$$

At this point, consult the tables published by the sprayer manufacturer to select the nozzle size which gives the required volume per hectare, for a given pressure, at the speed closest to 7.2 Km/hour, which is the one used as a reference in the example above.

CHECKING THE MEDIUM AND HIGH PRESSURE NOZZLES

- First of all, check that they are all of the same type and size, and that the spraying angle is the same.
- If possible, it is recommended to replace all the nozzles at the same time to avoid working with a combination of new and old nozzles, because their product distribution characteristics are altered by wear.
- To check for any differences between the delivery capacities of the various nozzles, place a container - preferably a graduated one - under each nozzle and wait for a certain amount of time (1 min). In this way it is possible to calculate the average delivery capacity of the jets, and to check that the differences between any two containers do not exceed 10%.

CONCLUSIONS

To achieve a good distribution pattern it is necessary to work at a constant ground speed, using a set of identical nozzles, after having correctly adjusted the distributors used (follow the instructions provided in the separate distributor manual).

DELIVERY CAPACITIES OF THE JETS IN LITRES PER SEC-

Nozzle diameter (mm)	Kg/cm³												
	5	8	10	12	15	18	20	25	30	40	50	60	70
1	1,1	1,3	1,5	1,7	1,9	2,1	2,3	2,5	2,8	3,3	3,8	4,3	4,8
1,1	1,3	1,5	1,7	2	2,2	2,5	2,7	3	3,3	4	4,6	5,2	5,9
1,2	1,5	1,7	2	2,3	2,7	3	3,2	3,6	3,9	4,8	5,6	6,3	7
1,3	1,7	2	2,3	2,6	3	3,4	3,7	4,2	4,6	5,6	6,6	7,1	8,3
1,4	2	2,3	2,7	3,1	3,5	4	4,3	4,9	5,3	6,5	7,6	8,6	9,7
1,5	2,4	2,9	3,3	3,8	4,3	4,8	5,1	5,6	6,2	7,5	8,8	10	11,2
1,6	2,9	3,4	3,9	4,4	5	5,4	5,7	6,4	7,1	8,1	9,9	11,3	12,7
1,7	3,5	4	4,5	5	5,6	6,1	6,4	7,2	7,9	9,6	11,2	12,7	14,4
1,8	4	4,6	5,1	5,6	6,3	6,9	7,2	8,2	8,9	10,8	12,6	14,2	16,2
1,9	4,5	5	5,6	6,2	7	7,6	8,1	9	9,9	12	14	15,8	17,9
2	5	5,6	6,3	6,9	7,7	8,5	8,8	10	11	13,4	15,5	17,6	19,8
2,1	5,5	6,2	7	7,6	8,6	9,4	9,9	11,1	12,1	14,7	17,2	19,4	21,9
2,2	6,1	6,8	7,7	8,4	9,4	10,3	10,8	12,1	13,3	16,2	18,8	21,3	24,1
2,3	7	7,5	8,3	9,2	10,3	11,2	11,8	13,3	14,5	17,7	20,7	23,3	26,3
2,4	7,5	8,1	9,1	10	11,2	12,3	12,9	14,4	15,8	19,2	22,4	25,4	28,6
2,5	8,2	8,8	9,9	10,8	12,1	13,3	14	15,7	17,2	20,3	24,3	27,4	31
2,8	9,5	11,1	12,4	13,6	15,3	16,7	17,5	19,7	21,5	26,2	30,4	34,4	39
3	10,5	12,7	14,2	15,6	17,5	19,1	20,1	22,5	24,8	30	35	39,5	44,7
	LT/1'												

The data and descriptions provided herein are nominal values and therefore non-binding.

PESTICIDE TREATMENTS

When performing pesticide treatments on crops, biological, environmental and economic aspects must be taken into account.
This requires in-depth knowledge of the pesticide products, their applications and limitations, and the most appropriate pesticide application equipment.

A treatment must achieve three objectives:

A. It must be effective (to avoid waste).
B. It must not damage the crop (consistently with the above conditions).
C. It must not constitute a hazard for the operator or for the surrounding environment.

Flushing of the entire system is essential after every product change. When using two non-mixable formulations in succession, check for possible incompatibilities either by carefully studying the product label or by consulting an expert.

	RUBBER	DESMOPAN	H.P.D.S.	VITON
Halogenated solvents	Not recommended	Not recommended	Not recommended	Excellent
Halogenated hydrocarbons	Not recommended	Not recommended	Not recommended	Excellent
Aliphatic hydrocarbons	Excellent	Poor	Fair Good	Excellent
Aromatic hydrocarbons	Good	Poor	Fair	Excellent
Ketones	Poor	Excellent	Poor to fair	Excellent
Alcohols	Good*	Poor*	Good*	Good*
Oxygenised solvents	Not recommended	Good	Not recommended	Not recommended
Amines	Not recommended	Poor to very good	Very good	Not recommended
Carbamates	Not recommended	Good	Good	Excellent

CONSIDERATIONS ON DIAPHRAGMS (RUBBER - DESMOPAN- HPDS- VITON)

WITH REGARD TO CHEMICALS AND OILS.

** General indications, there are different components within the same family of elastomers.*

The Viton diaphragm is characterised by excellent resistance to contact with products, but its mechanical resistance is lower than that of other diaphragms.

It is important to always choose the most favourable weather conditions, avoiding windy days (which lead to the pollution of adjoining, and possibly inhabited, areas) or imminent rain, which could result in runoff that rapidly carries the active ingredients into the water table, without giving the soil micro-organisms enough time to complete the initial product-activation phase. When in doubt, always consult the specialist institutes or the observatories for plant pathologies; it is always important to carefully read the manufacturer's indications on the label.

It is important to check that the pump capacity is adequate for the type of application; the pump delivery capacity must be greater than the total capacity of the sprayer, because the excess capacity permits the return of part of the solution to the tank.
The return line is essential for ensuring correct mixing of the product.
The maximum permitted concentration tolerance is 15%, measured according to ISO 5682/2.

An excessively high return capacity may cause the formation of foam inside the tank, as well deforming the return hoses which carry the fluid back to the tank (causing them to burst).
An excessive return capacity increases the water flow rate, leading to increased friction. As a result, the sum of the product temperature and the outside temperature can reach unacceptable levels of overheating, which may compromise the outcome of the spraying or herbicide application; in addition, there may be deformations, leading to breakage of plastic components, such as the diaphragm

in the case of the pump.

MEASURING THE EFFECTIVE PUMP DELIVERY CAPACITY

A sufficiently precise system for measuring the true pump delivery capacity is as follows:

A) Completely fill the tank.
B) Connect an accurate pressure gauge to the pump.
C) Disassemble the outlet hose fitting on the pump outlet, and connect an auxiliary hose leading to a container of known tare weight.
D) Start the tractor and adjust the engine speed so as to obtain 540 rpm on the power takeoff, which is the reference speed for most of the equipment on the market.
E) Run the pump for a certain amount of time (designated "t"), measured with a stopwatch;
F) Measure the volume of water displaced during the elapsed time, by weighing the amount of liquid left in the container.
If the result is lower than the pump rating plate data, it is necessary to carry out the test (see Installation page, Ref. C).

PROCEDURE FOR DETERMINING THE MINIMUM DELIVERY CAPACITY OF THE PUMPS ON SPRAYERS

At present there are no reference standards for determining the minimum delivery capacity of pumps assembled on spraying machines. Two formulas are generally used:

Pmin (l/min) = Pe x 1,10 + (Vx 0,05)

where Pe (l/min) = Q x L x (n) x v / 600

Q(l/ha) = volume to be distributed
L(m) = width of the boom or, in the case of air-blast sprayers, distance between crop rows
n (used only for air-blast sprayers) = Type of machine passage through the rows : 1 = passes through all rows; 2 = passes through alternate rows; 3 = passes through one row, then skip three rows, etc... .
v(km/h) = forward speed of the sprayer.
V(l) = tank capacity of the sprayer.

Example 1:
A 14 m spray boom with 800 litre tank which distributes 400 l per ha at a forward speed of 8 km/h must have a pump with a minimum delivery capacity (Pmin) of:

Calculate the delivery capacity Pe = 400 x 14 x 8/ 600 = 74.6 l/min
Pmin 74,6 x 1,10 + (800 x 0,05) = 122.13 l/min

Example 2:
An air-blast sprayer with a 500 l tank which distributes 300 l per ha in a vineyard with a row spacing of 2.8 m, with passages in alternate rows at a speed of 6 km/h, must have a pump with a minimum delivery capacity (Pmin) of :

Calculate the delivery capacity Pe = 300 x 2.8 x 2x 6 / 600 =16.81 l/min
Pmin =16,8 x 1,10 + (500 x 0.05) = 43.5 l/min

2) Pmin = Pe + (V x 0,05) in the case of sprayers with tank capacities up to 500 litres.
Pmin =Pe + (V x 0,1) in the case of sprayers with tank capacities greater than 500 litres.

It is important, however, to remember that these are only approximate calculations, applicable to sprayers in which the mixing of the liquid in the tank is achieved exclusively through the return of part of the liquid to the pump. In this connection, we should note that the efficacy of the mixing system often depends more on the technical solutions adopted (mixing methods and points) and on the tank construction features (shape, materials) than on the delivery capacity available for this operation.

PREPARING THE PUMP FOR OPERATION

- To facilitate rapid priming of the pump, hold the circuit at pressure " O " while keeping the distributor on the full By Pass position.
- Check the oil level in the tank after about 10 hectares of pump operation, because the amount of oil may decrease due to deformation of the diaphragms in contact with the product (causing more oil to be used).
- Do not use the pump at a rotation speeds or pressures which exceed the maximum limit indicated on the rating plate. In such cases, the warranty will be invalidated.
- The working pressure must be chosen with the outlet line closed and with the liquid all in the return (this is very important, especially when using one or more lances).
- When loading the tank by pump suction, the hose diameter must never exceed the standard size; in addition, the delivery head must not exceed 3m. In these conditions, the pump must always operate at 0 pressure.
- Check the performance of the control unit: its delivery capacity should not be lower than that of the pump; this applies to both low and high pressure distributors.
- In the event of breakage of the diaphragm, the oil changes colour and turns white; in cases where the tank is not clearly visible on the machine, use the *Annovi Reverberi* pump saver kit. Immediately stop the pump. If the diaphragms cannot be replaced immediately, drain the product from the tank to prevent the formation of rust on the mechanical components).

A.R. DIAPHRAGM RUPTURE OR OIL LEVEL LOW ALARM *(see page 49)*

The mechanical heart of the diaphragm pumps is lubricated with oil. A leakage may cause the oil level to drop, and a rupture of the diaphragm may lead to water becoming mixed with the oil, thus increasing the level in the reservoir.
If the operator fails to notice this in time, irreparable and costly damage may be caused to the internal components of the pump.

Annovi Reverberi has designed this alarm device which sends an electronic signal as soon as the oil level in the tank exceeds the maximum or falls below the minimum.
In most cases, the rupture of the diaphragm begins with a hole and takes a certain amount of time to empty the tank (naturally, the oil reservoir must be regularly checked to ensure that the condition remains under control).
The device consists of a level sensor and two normally open contacts, installed in the cover of the oil reservoir, as shown in the annexed figure.
When the float drops to approximately 5 mm below its minimum permitted point, the oil-low signal read relay closes and short-circuits the black (common) and brown conductors; when the float rises to approximately 5 mm above its maximum permitted point, the oil-high signal read relay closes, short circuiting the black (common) and blue conductors.
The current actuating the signal must not exceed 1 Ampere and therefore, if the maximum current is utilised, the system must be fitted with an 0.5 sq mm three-core cable.
The electrical contact can be connected to an acoustic alarm (siren) or to a visual alarm (emergency light), or connected directly to the control unit in order to react as required by the user.
When the device is installed on the machine, during the initial period of operation it is necessary to carefully monitor the oil level, which must be as centred as possible.
This prevents the device from being tripped by the normal variations in oil level, and generating false alarms.
In fact, in diaphragm pumps it is normal for the oil level to drop slightly after an initial period of use, without this causing any problem for the pump. The level may also vary according to the oil temperature, the working pressure, the input pressure to the pump produced by the system or by a partially clogged filter.

FLOAT WITH TYPE B N.O. CONTACTS WITH SWITCHABLE 1 AMP CURRENT
1ST CONTACT CLOSED WITH FLOAT AT 5 mm ABOVE UPPER POINT
2ND CONTACT CLOSED WITH FLOAT AT 5 mm BELOW LOWER POINT
MATERIAL: NYLON
WIRE LENGTH: 500 mm
WITH PVC OIL-PROOF SHEATHE, 50 mm STRIPPED WIRE COLOURS

BLUE: UPPER LEVEL
BLACK: COMMON
BROWN: LOWER LEVEL

BH 800 S
AR 813
AR 1265
AR 1254
AR 1554
} CODE. 2401

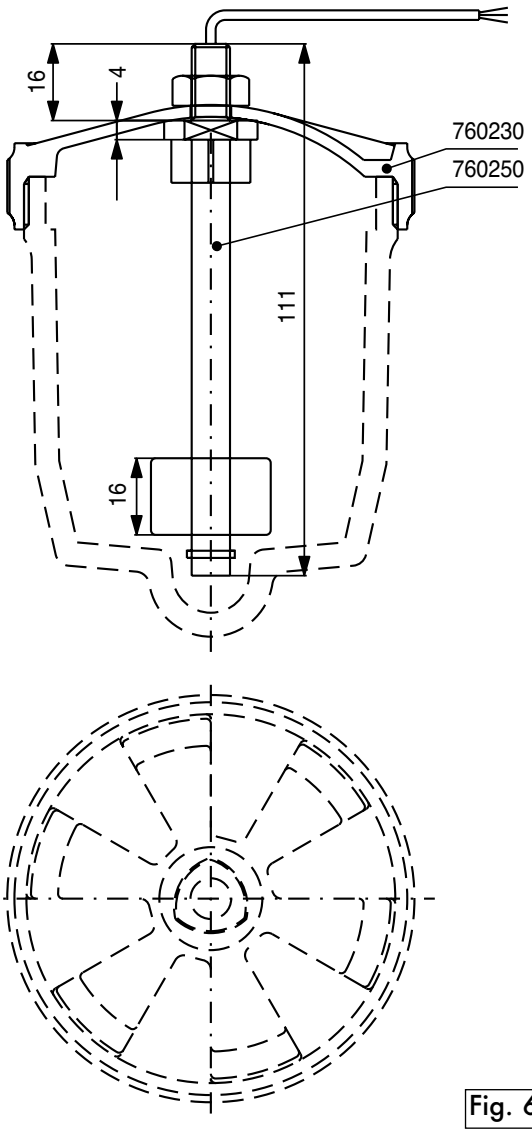
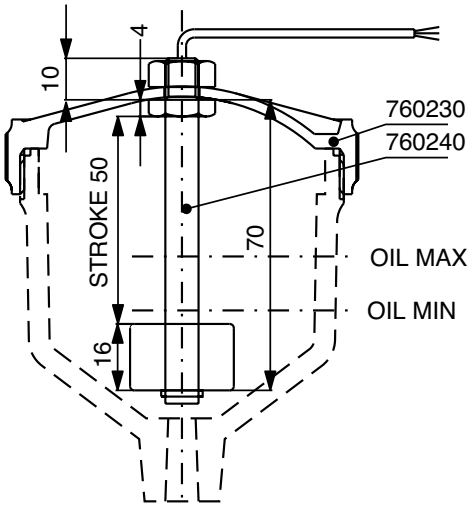
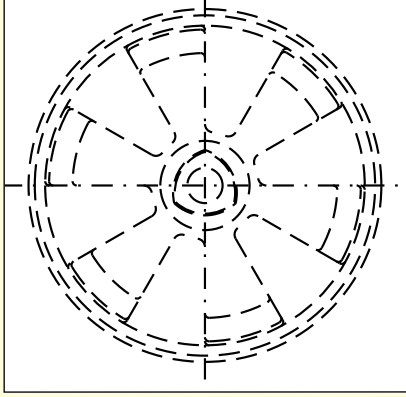


Fig. 6





FLOAT WITH TYPE B N.O. CONTACTS
WITH SWITCHABLE 1 AMP CURRENT
1ST CONTACT CLOSED WITH FLOAT AT 5 mm
ABOVE UPPER POINT
2ND CONTACT CLOSED WITH FLOAT AT 5 mm
BELOW LOWER POINT
MATERIAL: OT 58
WIRE LENGTH: 500 mm
WITH PVC OIL-PROOF SHEATHE
50 mm STRIPPED
WIRE COLOURS

BLUE: UPPER LEVEL
BLACK: COMMON
BROWN: LOWER LEVEL

AR 160 BP
AR 185 BP
AR 250 BP
AR 280 BP
AR 370 BP
BH 1000 S
AR 1064
AR 1516
BH 1500 S
} CODE. 2400

Fig. 7

English

END OF SEASON STORAGE

It is essential to wash the pump after use in order to prevent damage.
Never leave the solution of plant protection product or herbicide inside the pump; once mixing has stopped, certain products which are poorly soluble in water may form deposits which clog the outlet suction valves, the control units etc. *(Daily maintenance upon completion of field work)*.
Finally, remember that the products, which are for the most part corrosive, are more aggressive when left to stagnate inside the pump, rather than when they flow through it continually.
If the equipment is stored in a place where the temperature falls below zero, to prevent the liquids from freezing the following operations are recommended:
1) Drain the pump using the water outlet plug which is fitted on most *Annovi Reverberi* pumps.
2) Mix clean water for washing the pump with an anti-freeze liquid, so as to protect not only the pump but also all the components in contact with the liquid, e.g.: control unit, nozzle attachment and filters which have much smaller internal volumes and are therefore at greater risk.

Mix the anti-freeze as given on the label of the product being used.

It is important to leave the equipment in good working order, ready for the next season.
Have the pressure gauges checked by a qualified workshop, and do not hesitate to replace them if they are no longer accurate.
In the same way, it is necessary to check the pump (diaphragms, valves ... etc.).
Change the oil after every 500 hours of operation.

MAINTENANCE INSTRUCTIONS

Before carrying out any maintenance work:

- Ensure that no parts are in movement.
- Ensure that no part of the system is electrically live.
- If the pump is connected to an IC engine, disassemble the ignition plug.

MAINTENANCE INSTRUCTIONS FOR DIAPHRAGM PUMPS

The routine maintenance of the pump comprises the replacement of components subject to wear such as the diaphragms, oil, outlet suction valves and OR seals.
Disassembly-reassembly of the outlet suction valve with OR. Impurities and residues may obstruct the travel of the valve, causing wear of the OR.
Proceed as follows:
A) Back off the screws securing the valve plug, remove the valve plug (for medium and high pres-

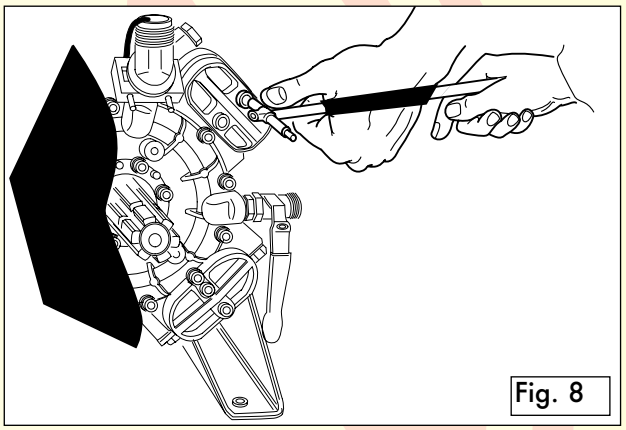


Fig. 8

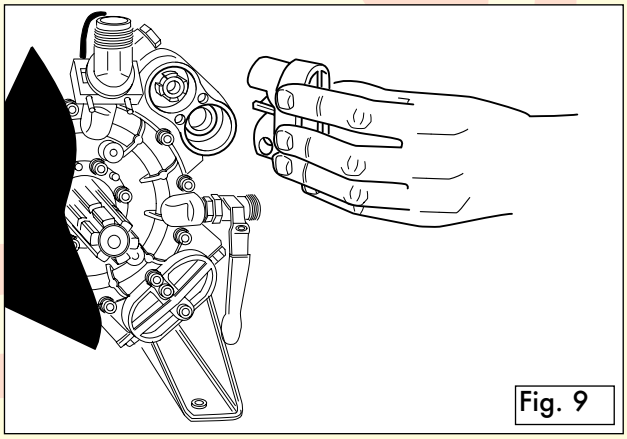


Fig. 9

sure pumps).

B)

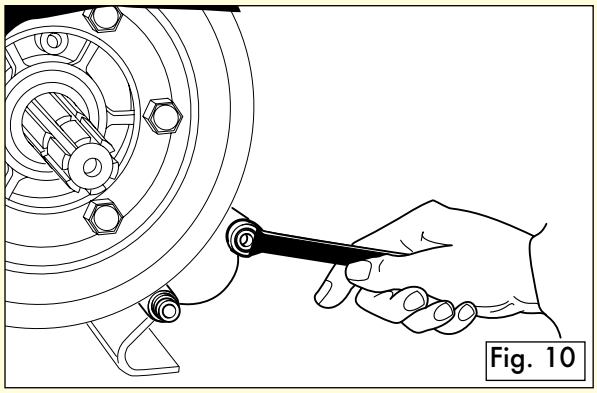


Fig. 10

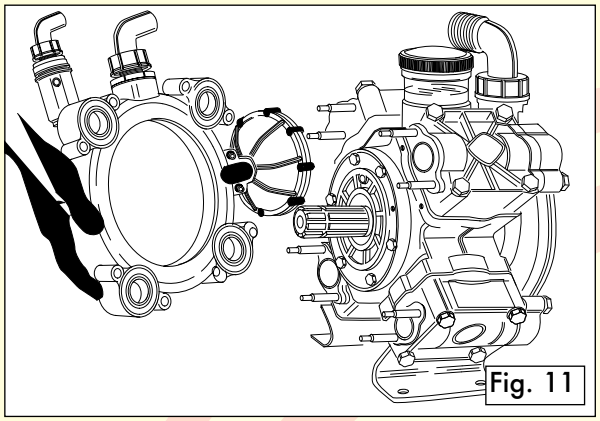
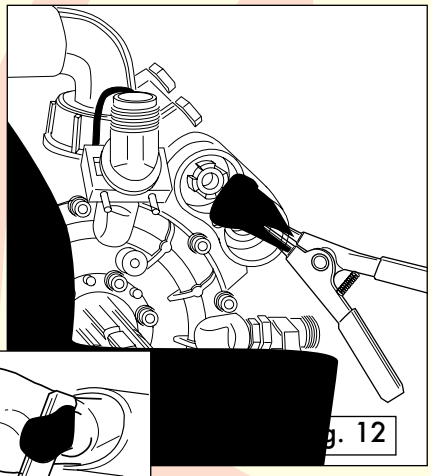


Fig. 11

Back off the fixing nuts of the suction and outlet ports (for low pressure pumps)



g. 12

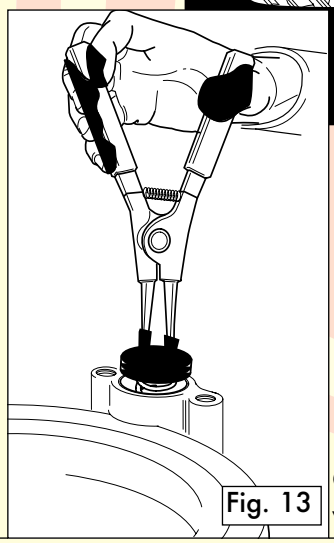


Fig. 13

C) Remove the valves and check their state of wear. Do the same for the O-ring.

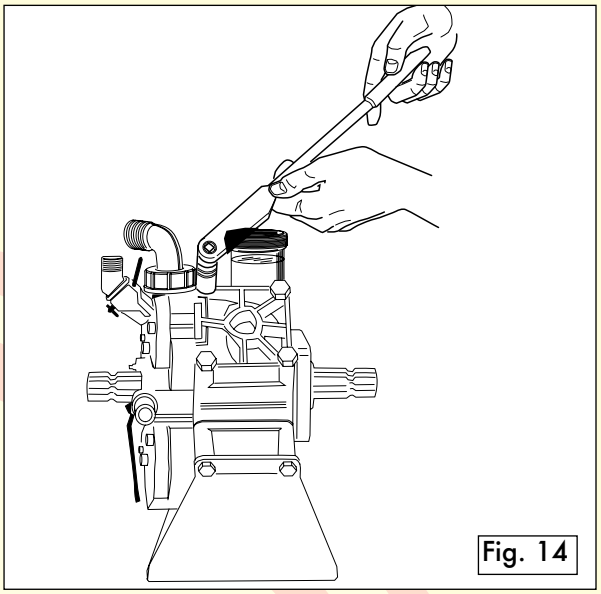


Fig. 14

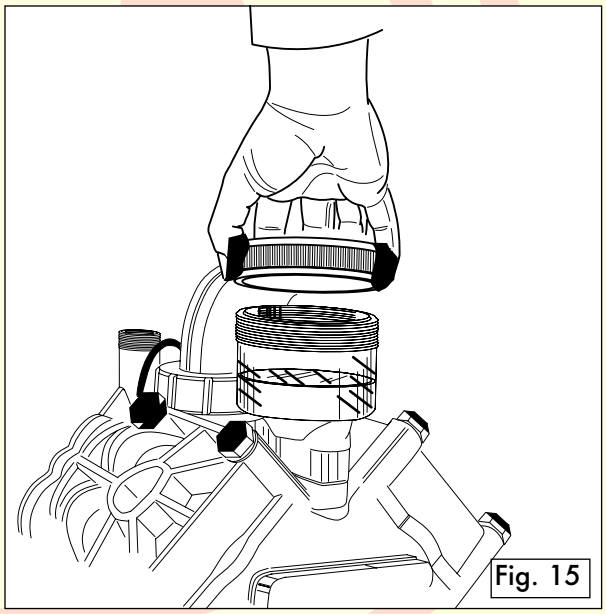


Fig. 15

English

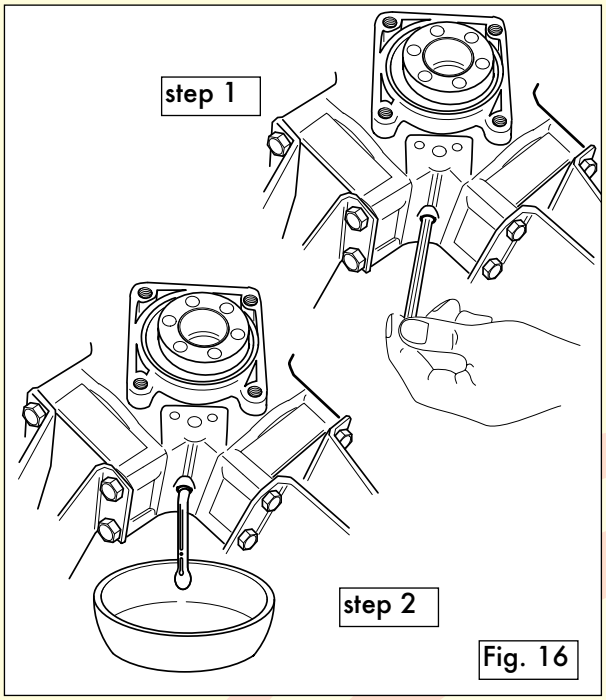


Fig. 16

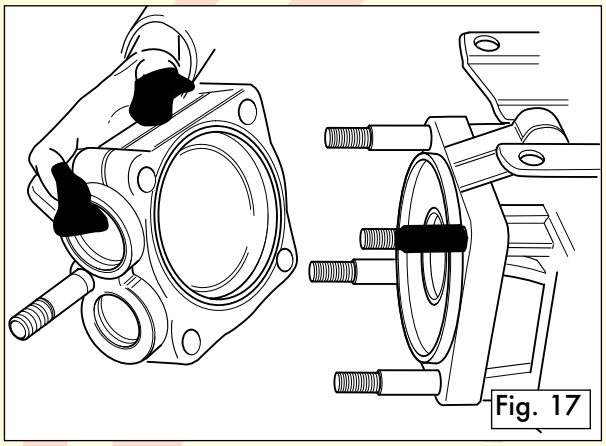


Fig. 17

D) Replace any worn components and reassemble them.
E) Repeat the above procedure for all the valves.
F) To assemble: carry out the above procedure in reverse order.

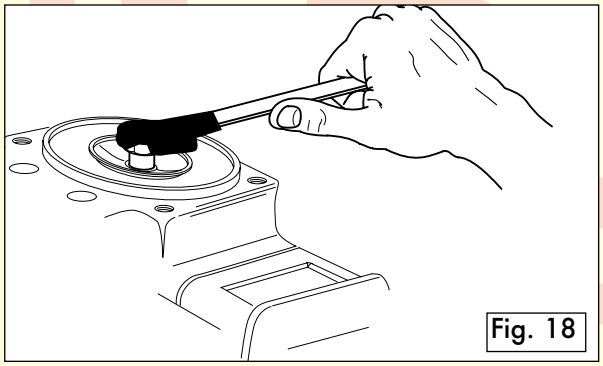


Fig. 18

G) It is very important (especially when the pump operates in the presence of vibrations) to regularly check the tightness of all the screws, with reference to the prescribed values of tightening torque.
H) Comply with the prescribed values of tightening torque.

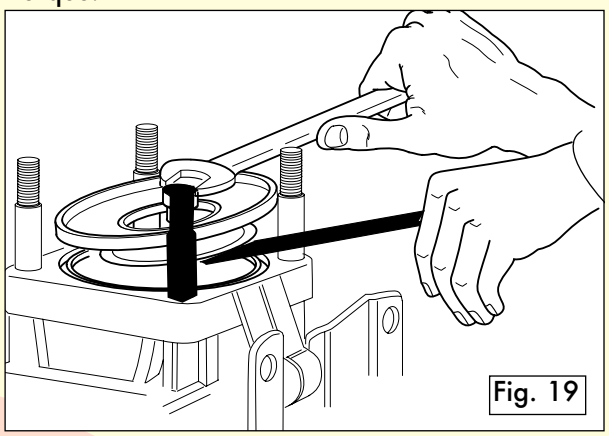


Fig. 19

See exploded views with values from Pages 229-250.

REPLACING THE DIAPHRAGM

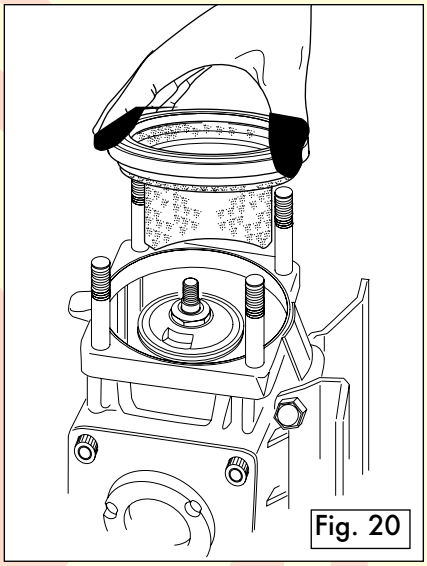


Fig. 20

1) Remove the oil cap.

2)

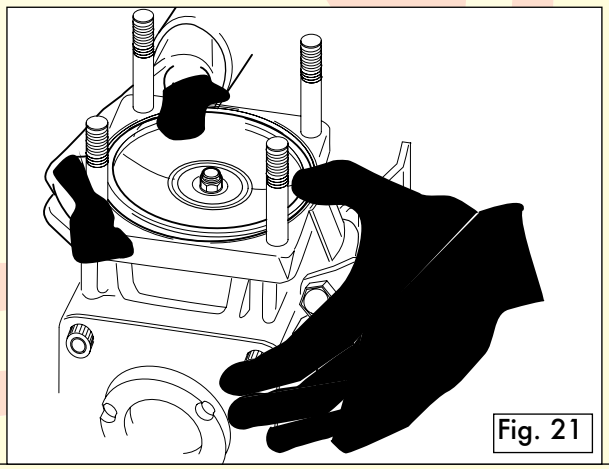


Fig. 21

Drain the oil by unscrewing the special plug situated under the pump casing (step 1) for complete emptying (step 2)
WARNING!! Lubricating oil pollutes the environment!! Do not dispose of it in the sewers.

3) Disassemble the pump head ends one at a time.

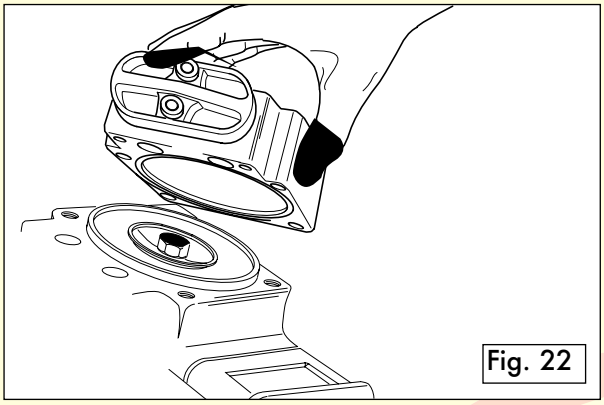


Fig. 22

4) Use a fork spanner to remove the diaphragm fixing screw.
Remove the fixing screw and the plate (Procedure

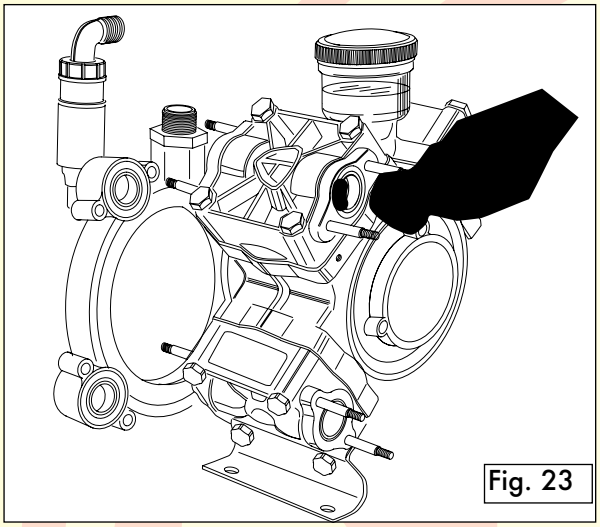


Fig. 23

for semi-hydraulic pumps).
For hydraulic pumps, use a steel rod to hold in place the pivot which has a ø 4 mm through hole, and then remove the fixing nut using a fork spanner. Depending on the state of wear, proceed to wash the interior with diesel oil.

5) If the piston liners are removed, they must all be subsequently reassembled in their original positions.

6) Check the state of wear of the piston segment; a worn segment may cause premature breakage of the diaphragm, in that it fails to supply the oil bearing underneath it during the maximum travel phase (pump pressurized).

7) To assemble the diaphragms in the semi-hydraulic

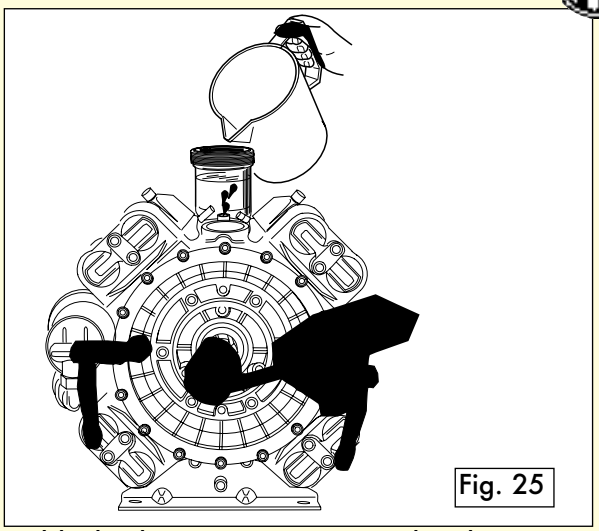


Fig. 25

and hydraulic versions, carry out the above procedure in reverse order. The diaphragm must be assembled with the piston at the lowermost point and the bord-ers perfectly inserted in the groove along the circumference.

8) MEDIUM AND HIGH PRESSURE PUMPS.
Reassemble the head ends, being careful to correctly position the RH and LH sides (match up the references on the casing and head end).

LOW PRESSURE PUMPS.
Reassemble the head ends, using the position of the two suction-outlet ports as a reference.

9) Fill the pump with oil through the reservoir, while simultaneously turning the shaft by hand. In version AR 1524 -1554 bleed the air by backing off grub screws m10 one at a time, turning the shaft until the air is expelled from the oil; proceed in the same way for the second grub screw after having locked down the first one.

10) Proceed to check the oil level with the pump running at pressure "0" until all the air bubbles have come out.
After the first oil level check, perform a second check with the pump pressurized.
Keep the pump pressurized for a few seconds, then return it to pressure "0"; use the control unit to repeat-edly switch between 0 pressure and high pressure until the air bubbles come out. When bleeding is complete, close the reservoir with its cap.

To facilitate this operation, turn the shaft by hand while adding the oil, in order to expel all the air (air is harmful, and may cause rupture of the diaphragm). The reservoir is full when the previously prepared quantity of oil has been used up.

Regular inspection of the diaphragms is recom-

mended.

To order spare parts, specify:

Plastic coated spraying diaphragm pumps with Dacromet nuts and bolts

TYPE	KG
AR 70 bp	0,600
AR 115 bp	0,800
AR 125 bp	1,154
AR 135 bp	0,830
AR 145 bp	1,154
AR 160 bp	1,200
AR 185 bp	1,200
AR 215 bp	2,300
AR 250 bp	2,300
AR 280 bp	2,300
AR 320 bp	2,400
AR 370 Twin bp	2,400
AR 500 Twin bp	4,600
AR 560 Twin bp	4,600

Anodized and plastic coated medium pressure diaphragm pumps

TYPE	KG
AR DUE	0,080
AR 202 AR 252	0,270
AR 30	0,530
AR 50	1,000

Anodized medium and high pressure diaphragm pumps

TYPE	KG
AR 303	0,300
AR 403	0,300
AR 503	0,400
AR 713	0,550
AR 813	0,550
AR 1064	0,800
AR 1265	1,200
AR 1516	2,200

Brass high pressure diaphragm pumps

TYPE	KG
BH 800 S	0,550
BH 1000 S	0,800
BH 1200 S	1,200
BH 1500 S	2,200
BHS 110	2,600
BHS 140	2,600
BHS 150	2,900
BHS 200	2,900

Anodized high pressure diaphragm pumps

TYPE	KG
AR 1254	2,500
AR 1554	3,150

SHAFT TIMING

AR 320 - 370 - 500 - 560 Bp Twin

CAUTION!!

Whenever the two pump modules are separated during maintenance, the instructions given on the shaft timing warning plate located externally inside the suction port must be followed in full during reassembly.

Position the first shaft reference vertically (either up or down).

The second shaft reference inside the coupling must be diametrically opposed to the first, with a further displacement of two teeth for the AR 320-370 Bp Twin, and of a single tooth for the AR 500-560 Bp Twin, either clockwise or counterclockwise.

Failure to follow these instructions in full can cause the hydraulic plant to function irregularly.

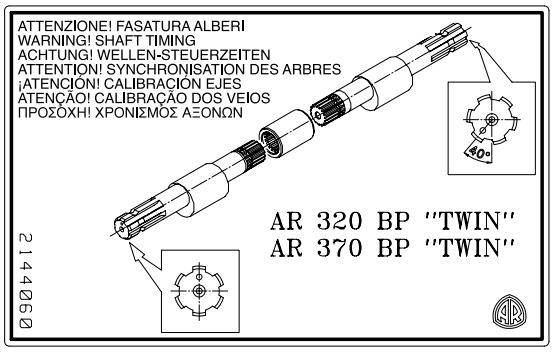


Fig.

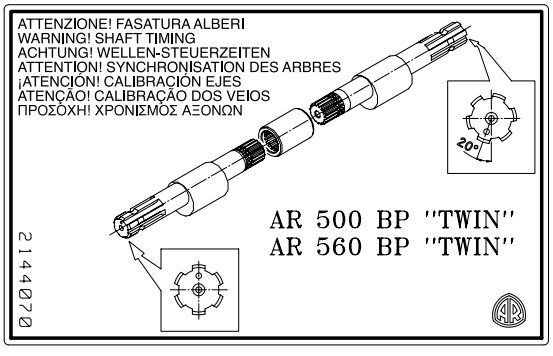


Fig.

TROUBLESHOOTING

PROBLEMS	CAUSES	SOLUTIONS
The pump fails to fill.	One or more valves are not correctly sealed	Check the valve seats and clean them
The pressure gauge shows sudden changes in pressure	The pump is drawing air or the air chamber has not been filled	Check the suction hose. Run the pump with the return valve and outlet valves open
The water outlet is irregular	The air chamber is empty	Fill the air chamber to 1/10 of the pump's working pressure
The water comes out but without pressure	The return valve is worn	Replace the valve and, if necessary, the valve seat too
The delivery capacity decreases and the pump is noisy	The oil level is low	Add oil until the reservoir is half full
Oil comes out of the return	One or more diaphragms are broken	Drain the oil from the pump, disassemble the head ends and replace the worn diaphragms. Replace

A) Type of pump and serial number.
B) Code number of the part.
C) Quantity.
D) Desired type of shipment.

ATTENTION

Do not use the pump with flammable fluids, or with fluids whose characteristics are incompatible with the cor-

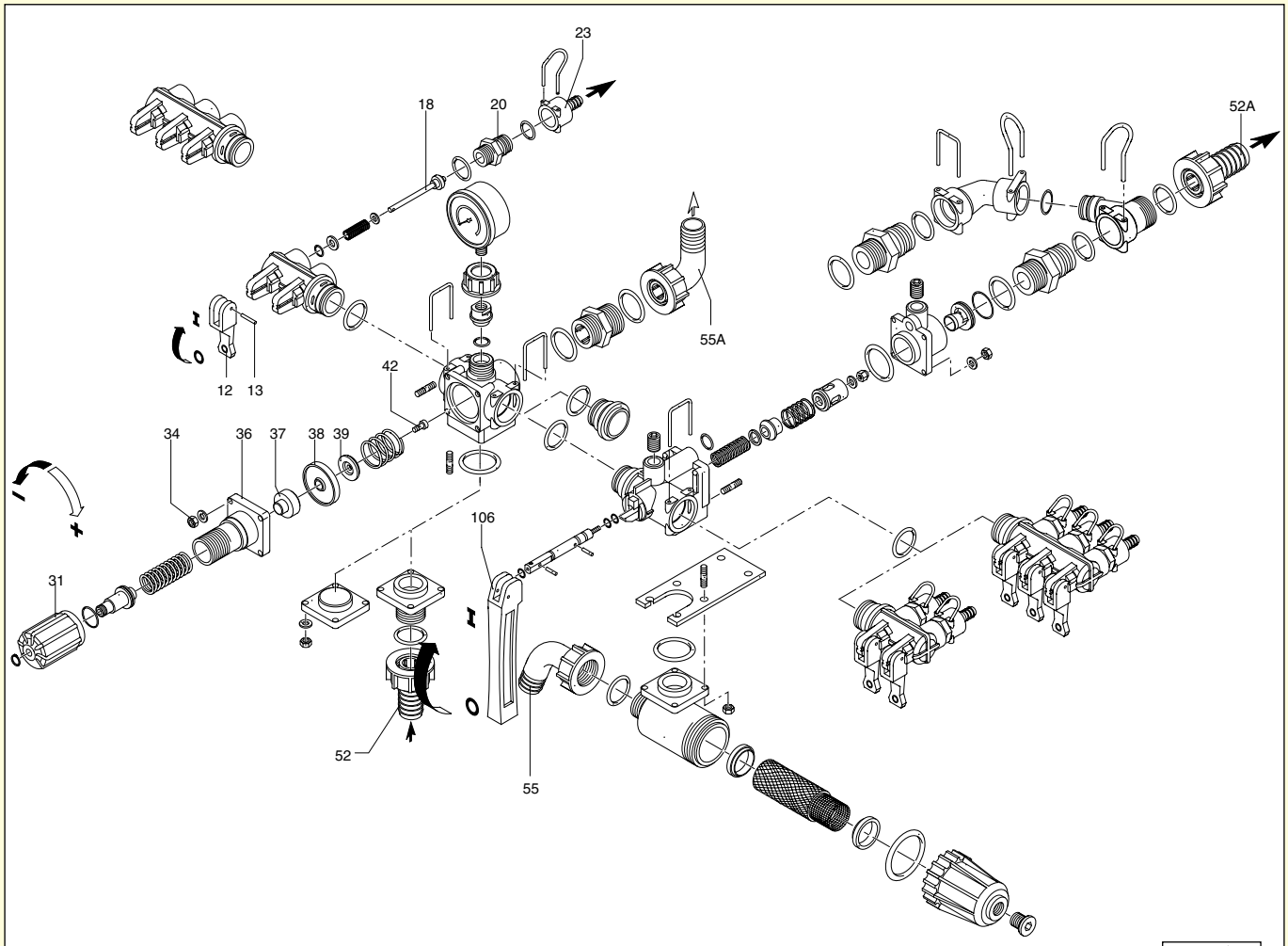


Fig. 46

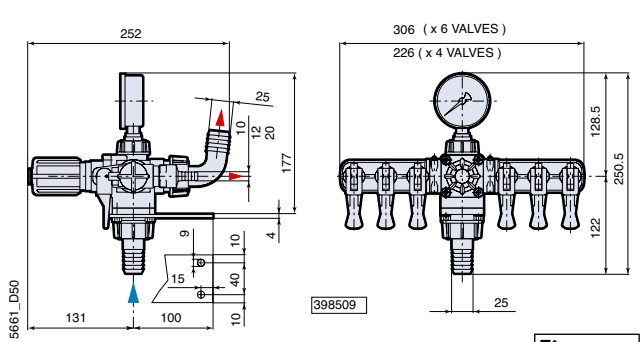


Fig.

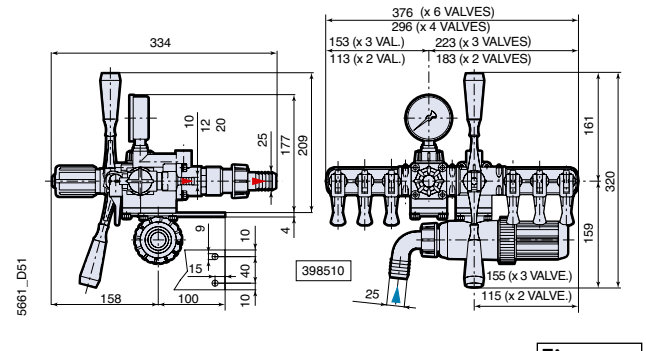


Fig.

rect operation of the pump.

OIL QUANTITIES

USE SAE 20W40

ECM-UCM CONTROL UNITS

DESCRIPTION AND APPLICATION

The ECM-UCM control unit is used for regulating the working pressure and for distributing the liquid in herbicide sprayers.

HOSE CONNECTIONS

Fitting 55 or 52 is connected to the hose arriving from the pump, while fitting 55A or 52A is connected to the return hose which carries the unused liquid back to the tank. Fittings 23 must be connected to a number of boom supply hoses equal to the number of sections in the boom itself.

ADJUSTING THE PRESSURE

The working pressure is adjusted by means of knob 31. Turn in a clockwise direction to increase the pressure, or in an anticlockwise direction to decrease the pressure. The pressure must be adjusted with lever 106 in position 0 and with the boom supply valves in the open position (I).
The boom supply valves are opened and closed by operating lever 12. Before starting treatment, adjustment of the pressure using water is recommended; check for any leaks in the various pipe connections and fittings. Pressure adjustment must be made with the power takeoff at 540 rpm max., or in any case at the speed of rotation which corresponds to the chosen working speed.

OPERATION

During the various phases of the treatment, it is possible to partially shut down certain boom segments by using lever 12 to operate the corresponding valve. In such cases, the ECM-UCM will not produce pressure variations of sufficient magnitude to influence the product application rate. To completely shut down the supply of liquid and depressurize the boom, simply lift lever 106 from position I to position 0 (UCM only). If the anti-drip device is installed, it will be automatically engaged when lever 106 is lifted (UCM). At the end of the treatment, it is good practice to flush the system by circulating clean water through it. If the ECM-UCM is equipped with a filter, clean the filter daily by unscrewing the filter cover, or by using the self-cleaning system.

MAINTENANCE INSTRUCTIONS

Routine maintenance of the unit includes the replacement of parts such as the valve pos. 39, the diaphragm pos. 38, the valve stem assembly pos. 18.
Impurities or residues may damage the valve.

- Back off the four M6 - 5587 screws pos. 34 and remove the upper body pos. 36.
- Pull out the assembly consisting of three parts pos. 37-38-39.
- Hold piston pos.37 in place using a vice, and back off the M6X 34 socket cheese head screw pos. 42.
- Replace the valve; this operation is normally performed in conjunction with the replacement of the diaphragm pos. 38.

REPLACING THE VALVE STEM ASSEMBLY

- Using a spanner, remove the 20 x 1.5 seat adaptor pos. 20 (check the state of wear of the seat).
- Use a pointed tool to remove the component pos. 13
- Remove the stem from the valve body, and replace it.

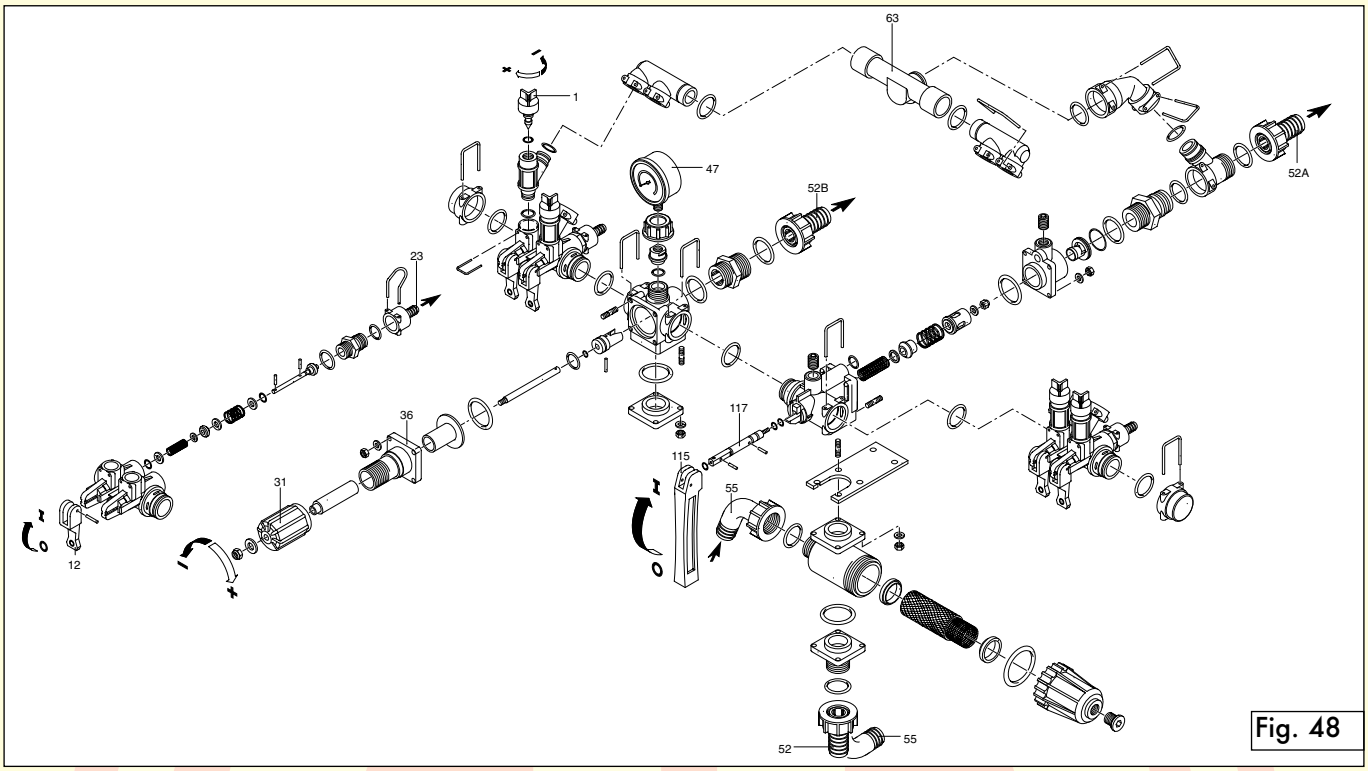


Fig. 48

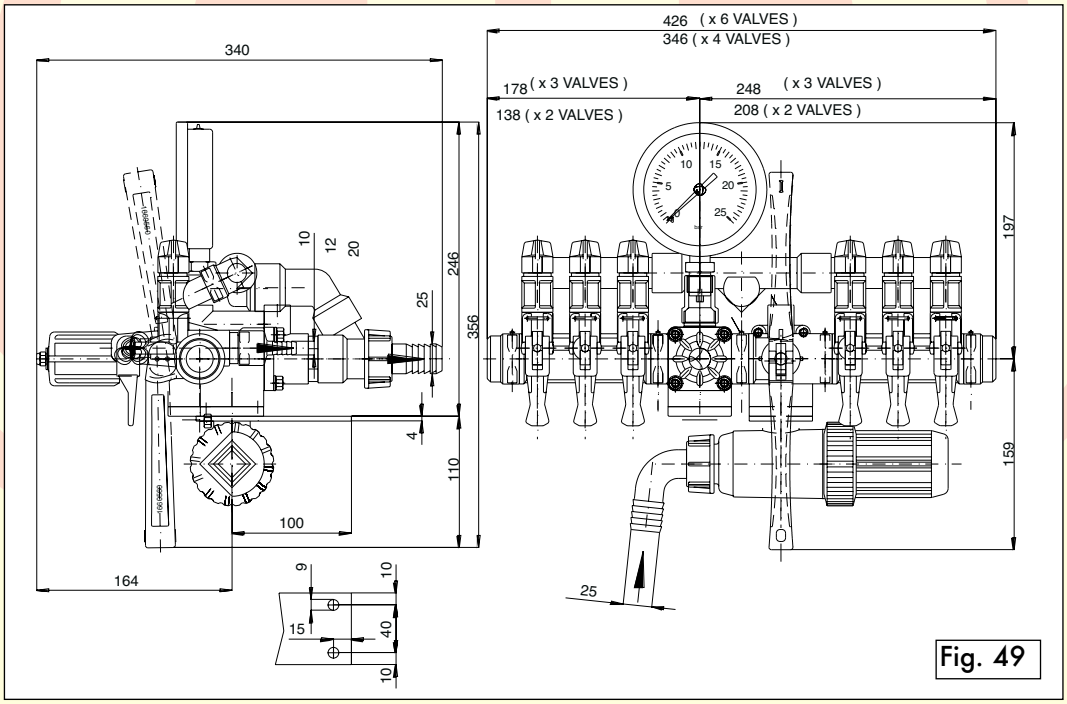


Fig. 49

English

To reassemble, carry out the above procedure in reverse order.
Replacement of the O-rings is recommended (see OR Kit exploded view catalogue).

IDROMINUS CONTROL UNIT DESCRIPTION AND APPLICATION

The Idrominus distributor is used for regulating the working pressure and maintaining a constant product application rate in sprayers and liquid fertilizer distributors.
The distributor is equipped with:

- Valve body (2 to 6 way). Pressure adjustment knobs for each outlet
- Regulating valve group
- Control lever for the simultaneous opening and closing of the valves
- Glycerine bath pressure gauge.

HOSE CONNECTIONS WITH OR WITHOUT A FILTER

Fitting 55 connects to the incoming hose from the pump outlet port. Fittings 52A and 52B connect to the return hoses leading back to the tank.
Hose 52A must only go into the tank, while hose 52B must continue to the bottom of the tank, well away from the pump. Fittings 23 are connected to: the boom supply hoses, the hydraulic mixer and the ejector.

ADJUSTING THE WORKING PRESSURE

With the machine at a standstill, check that:

- The control lever 115 is turned downward - Pos. 0 (fully empty).
- The pressure regulating knob 31 is backed off to the beginning of its thread 36.
- The valve levers 12 are turned upward - supply to the boom open.
- All the knobs 1 are fully locked down and then backed off by 2 and a half turns. (Pos.I)

WATER TEST

1. Start running the machine with the power takeoff at 550 rpm max, or at the rpm speed corresponding to the speed in km/h chosen for the treatment.
2. Raise the lever 115 and lock down the knob until the pressure gauge reading shows the required working pressure 47.
3. Close one of the supply lines to the boom by lowering the corresponding valve lever 12. At this point there may be a reduction in the pressure, which can be returned to the required level by slowly turning the knob 1.
4. Repeat step 3 for all the supply lines to the boom and mixer.
   N.B. if a valve outlet is not used, the corresponding lever 12 must be lowered, and its knob 1 must remain closed (locked down).
5. Open all the adjusted valves by raising their levers 12.

At this point IDROMINUS is ready for use. Each individual closing, and rpm variations of +15% - 15% for a given tractor gear, will not cause variations in the quantity of product distributed per unit surface area (constant application rate).

To shut off the supply to the boom, lower the zero pressure/fully discharged lever 115. To revert to the preceding working conditions, lift the lever 115 to the up position.

USING THE EJECTOR

Regulating knob 31 fully backed off to the end of the thread 36.
Close all the boom supply valves, levers in the down position.
Open the valve connected to the ejector 12 in the up position.
Lift the distributor pressure lever to the highest possible position, visible on the pressure gauge 47, then lock down the knob 31 and proceed to

fill the tank.

Remember that whenever the boom nozzles are replaced or the ejector is used, it is necessary to repeat the procedure "ADJUSTING THE WORKING PRESSURE".

IMPORTANT

At the end of each treatment it is good practice to flush the ejector by circulating clean water through it.

DO NOT POLLUTE THE ENVIRONMENT!!!

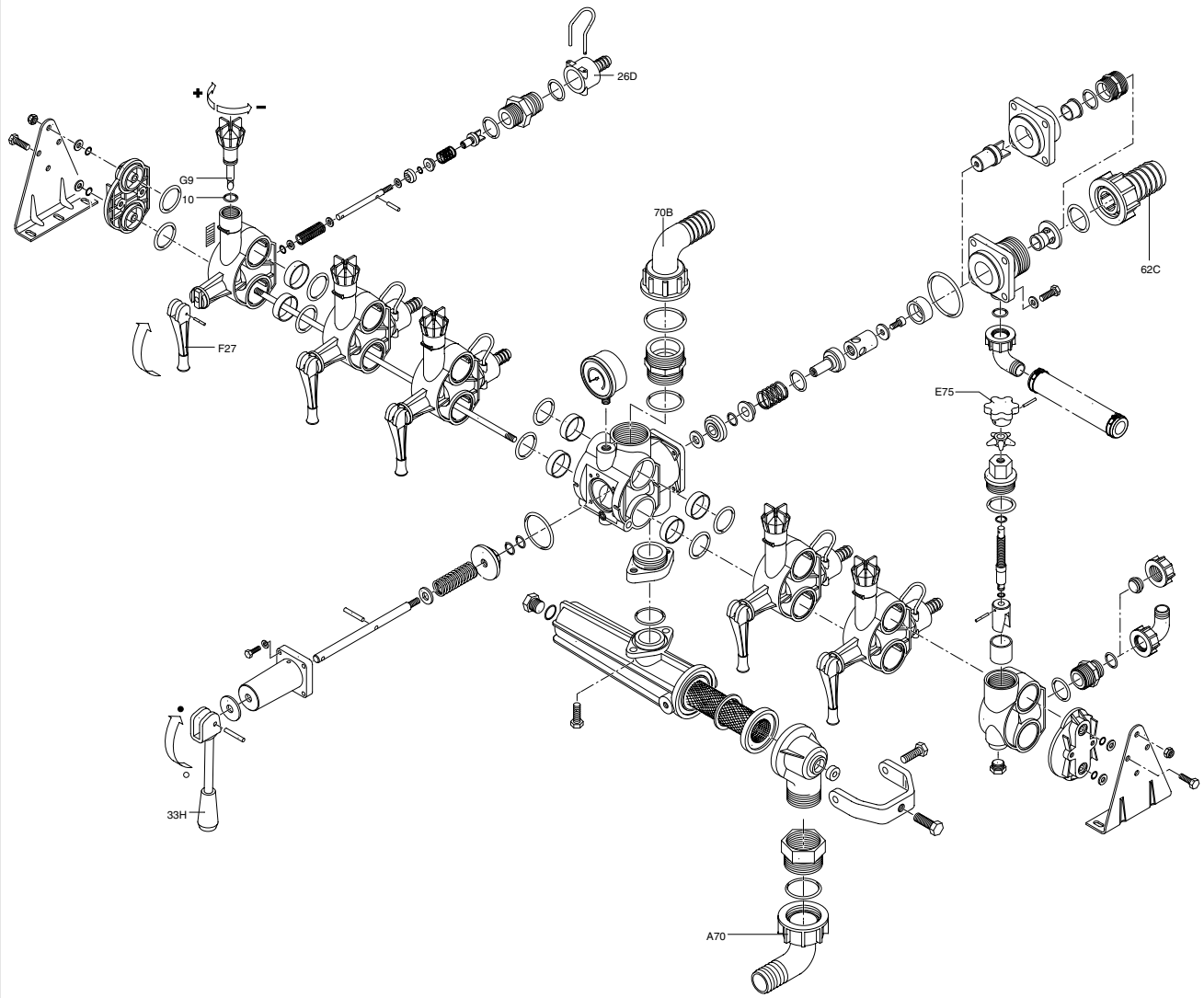


Fig. 50

IDROCOSTANT M CONTROL UNIT

DESCRIPTION AND APPLICATION

The IDROCOSTANT distributor is used for regulating the working pressure of herbicide sprayers and for distributing the liquid in sprayers and liquid fertilizer distributors.

The unit is equipped with:

- Valve body (2 to 8 way) for supplying the boom.
- Pressure regulating knobs for each outlet.
- Regulating valve group.
- Control lever for simultaneously opening and closing the valves
- Glycerine bath pressure gauge.

CONNECTING THE HOSES

Fitting A70 connects to the hose carrying the incoming liquid from the pump. If there is a filter, the hose is connected to the corresponding fitting on the filter. Fittings 62 C and 70 B are connected to the return hoses which carry the unused liquid back to the tank. Fittings 26 D are connected to a number of boom supply hoses that is equal to the number of boom sections.

ADJUSTING THE WORKING PRESSURE

1. Before allowing water to enter the distributor, make sure that knob E 75 is fully backed off, i.e. turned in an anticlockwise direction, in the up position (toward the - bar symbol).
2. Open all the boom supply valves by raising lever F 27 and place the regulating knobs G 9 on index 10 of the graduated scale, taking care to ensure that all the knobs G 9 are in the same position, with lever H 33 in the up position.
3. Start the pump with the machine at standstill and with the power takeoff at 550 rpm max, or at the rpm speed corresponding to the chosen working speed in km/h.
4. Lower lever H 33 and lock down knob E 75 by turning it in a clockwise direction (down toward the + bar symbol) until the desired working pressure appears on the pressure gauge.
5. Close one boom supply valve by lowering only one of the levers F 27. At this point, there will be a reduction in the pressure; lock down knob G9 on the valve until the pressure gauge once again returns to the original value.
6. Repeat step 5) for each of the boom supply valves. At the end, the position of each knob G9, on the graduated scale of each supply valve, will roughly corres-pond to that of the others. Open all the boom supply valves by lifting up levers F27.
7. At this point, the IDROCOSTANT is ready for use. Closing off individual boom sections, or changing the speed within the chosen tractor gear, will not affect the product application rate.
   In order to completely shut off the supply of product to the boom and return to zero pressure, lift up lever H 33. In order to continue with the treatment, simply lower lever H33 again to resume working in the preceding conditions.

IMPORTANT:

At the end of each treatment, it is good practice to flush the system by circulating clean water through it.

GI 40

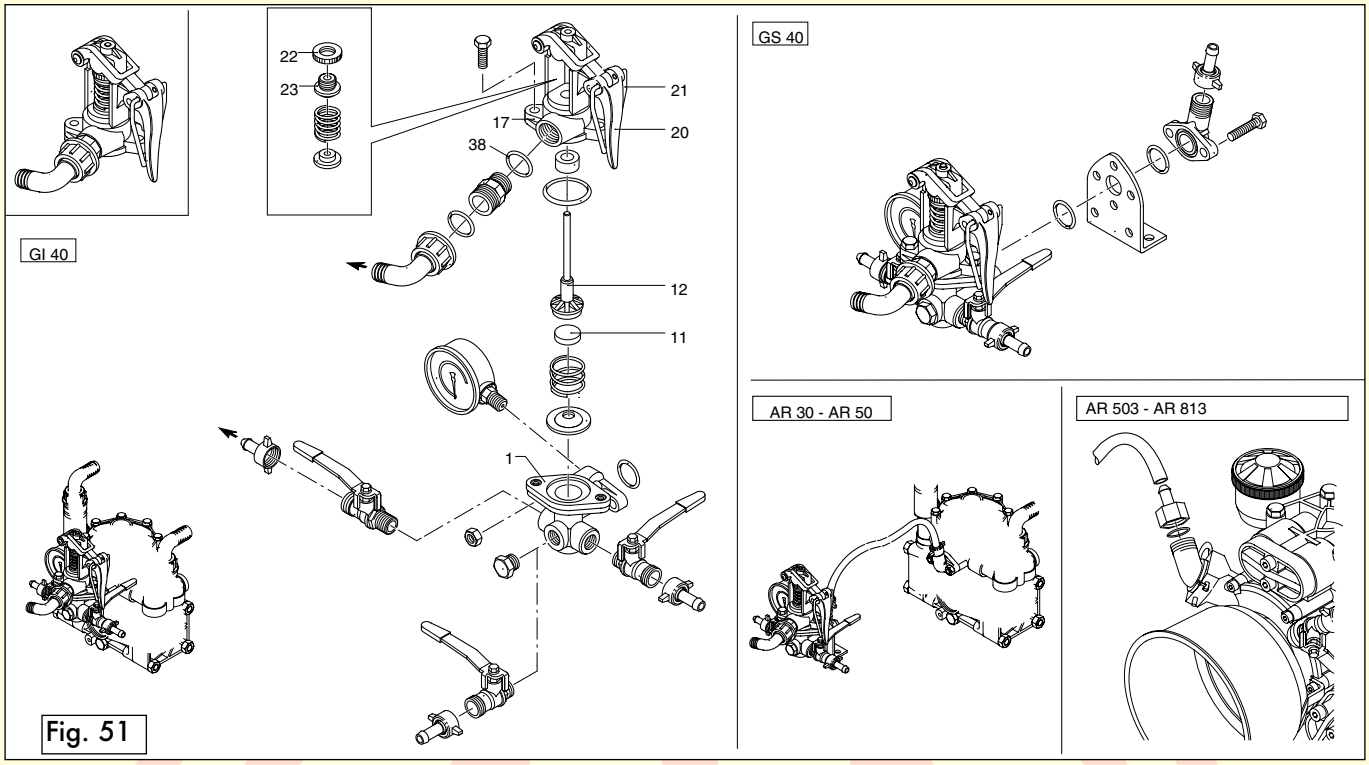


Fig. 51

RM 40

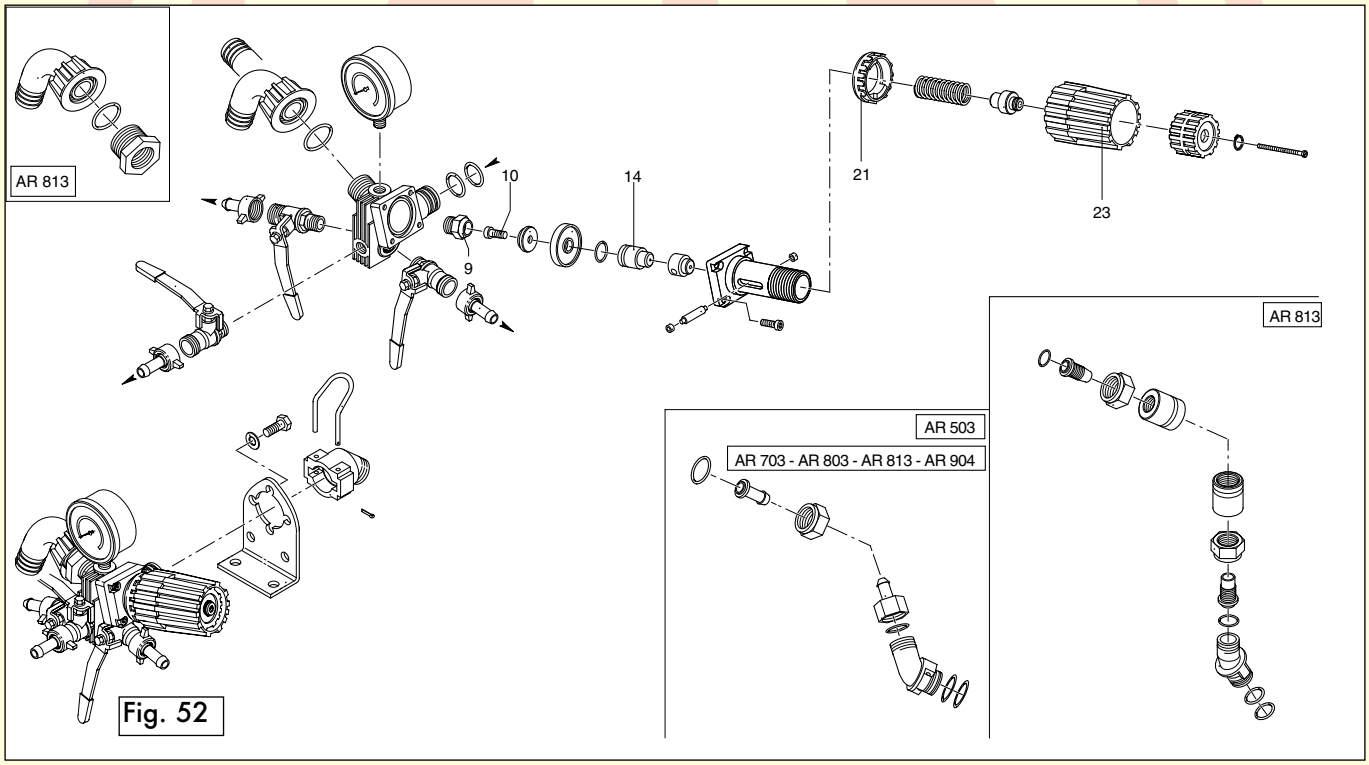


Fig. 52

INSTALLATION/ OPERATING INSTRUCTIONS FOR GI 40, RM 40 CONTROL UNITS.

The control unit is used for distributing the working pressure in the distribution of liquids for spraying. The number call-outs are referred to the exploded view of the product.

ASSEMBLY ON THE PUMP

1. Lubricate and assemble the OR on the body, inserting the OR into the pump outlet port.
2. Connect the return port to the tank, directly and without pinching.
3. Connect the high pressure hoses to the outlet valves.

REMOTE ASSEMBLY

1. Securely assemble the bracket.
2. Lubricate and assemble the ORs on the body, and insert the body into the fitting.
3. Assemble the fittings on the high pressure hose lead-ing to the pump, then connect to the pump outlet port.
4. Connect the return port to the tank, directly and without pinching.
5. Connect the high pressure hoses to the outlet valves.

OPERATING INSTRUCTIONS FOR GI 40

1. Refer to the operating instructions of the pump.
2. Circulate water through the system, checking for any leaks in the pipe connections and fittings of the hydraulic system.
3. Adjust the pressure by inserting the tie bolt (21) into one of the four slots, until the correct working pres-sure is obtained. Use the plate (22) to make fine adjustments.
4. Flush the inside of the control unit with water after each use, in order to remove any residues of aggressive products.

OPERATING INSTRUCTIONS FOR RM 40

1. Refer to the operating instructions for the pump.
2. Circulate water through the pump, checking for any leaks in the pipe connections and fittings of the hydraulic circuit.
3. Turning the front control (21) to the right oper-ates the rapid discharge into the tank. Conversely, turning it to the left supplies the out-lets to the loads. Knob (23) regulates the work-ing pressure: turn in a clockwise direction to increase (+), or in an anticlockwise di-rection to decrease(-).
4. Flush the inside of the control unit with water after each use, in order to remove any residues of aggressive products.

MAINTENANCE INSTRUCTIONS

The routine maintenance of the unit comprises the replacement of:

GI 40 wear lining pos. 11.

➥Back off the two M8x25 HH screws, remove the valve mount pos.17

➥Remove the lining from the valve stem pos. 12 and replace.

➥Check the state of wear of the valve seat pos. 5, and replace if necessary.

RM 40 stainless steel valve pos. 11.

➥Back off the m 3x60 screw pos. 38.
➥Remove the knob pos. 23.
➥Unscrew the four m 6x20 screws pos. 20.
➥Remove the diaphragm pos. 112 from the upper body.
➥Secure the piston pos. 14 , backing off the screw pos. 10.
➥In the meantime, check the state of the valve seat pos. 9, and replace if necessary.

VDR 50

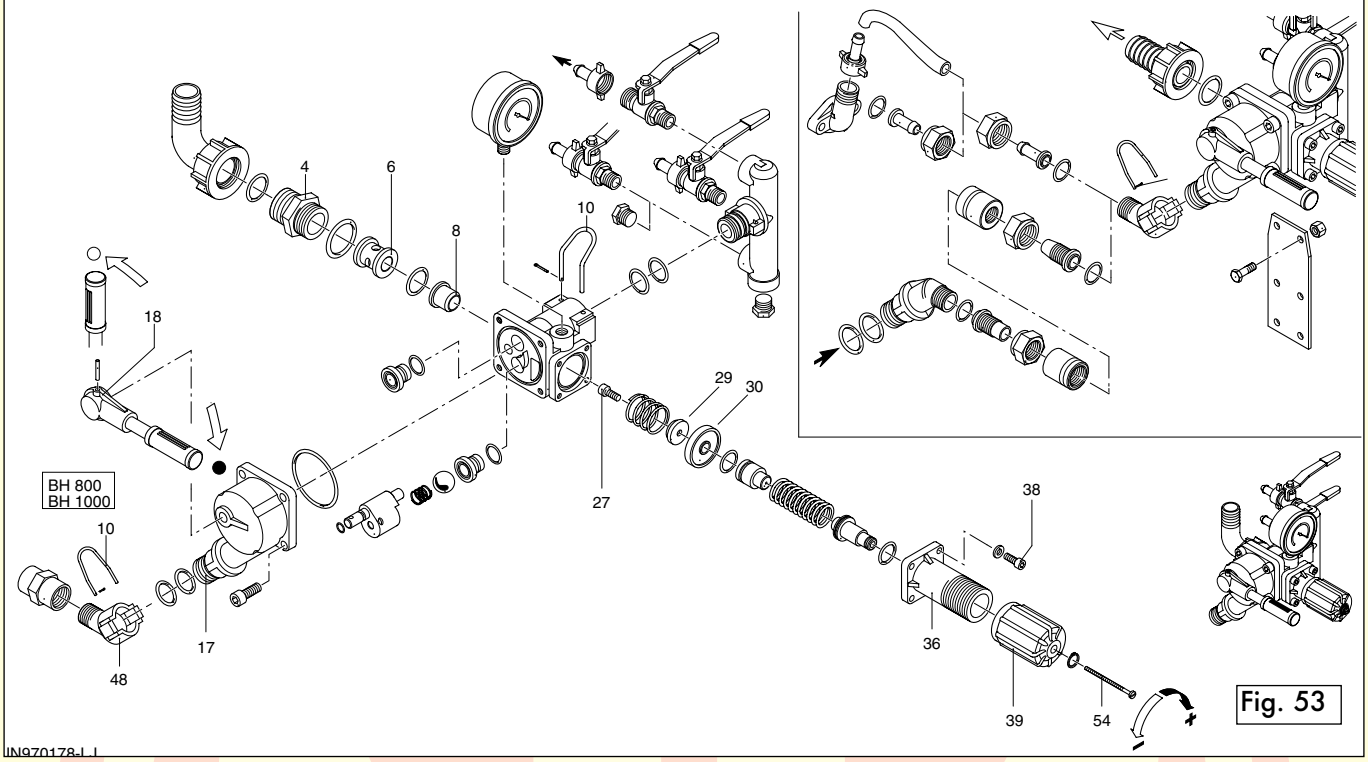


Fig. 53

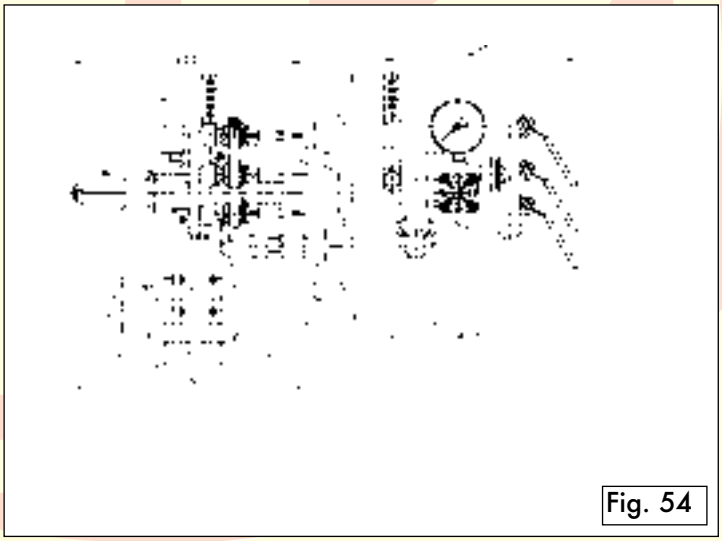


Fig. 54

INSTALLATION /OPERATING INSTRUCTIONS

VDR 50 CONTROL UNIT

DESCRIPTION AND OPERATING INSTRUCTIONS

The VDR 50 control unit is used for regulating the working pressure for the distribution of liquids in sprayers.
The number call-outs are referred to the exploded view of the product.
The unit consists of a pressure regulating diaphragm valve, which can be calibrated manually using the red knob (39). The same main body also incorporates a rapid discharge valve. The pressurized outlet toward the loads is channelled via a 4-way manifold with 2 valves (+ 2 optional).

ASSEMBLY ON THE PUMP

1. Lubricate and assemble the OR (13) on the body(17), and insert the body into the pump outlet port, securing it with the clip(10).
2. Connect the return (1) to the tank, directly and without pinching.
3. Connect the high pressure hoses to the outlet valves.

REMOTE ASSEMBLY

1. Securely assemble the bracket (52).
2. Lubricate and assemble the ORs (13) on the body (17), and insert the body into the fitting (48), securing it with the clip (10).
3. Assemble the quick couplings to the high pressure hose leading to the pump, and then connect VDR 50 to the pump outlet.
4. Connect the return to the tank, directly and without pinching.
5. Connect the high pressure hoses to the outlet valves.

OPERATING INSTRUCTIONS

1. Refer to the operating instructions of the pump.
2. Circulate water through the system, checking for any leaks in the pipe connections and fittings of the hydraulic circuit.
3. The two-way lever (18) operates the rapid return to the tank when placed in the vertical position (○). Conversely, in the horizontal position (●) it supplies the outlets toward the loads.
4. The knob (39) adjusts the working pressure: turning in a clockwise direction increases the pressure(+), while turning in an anticlockwise direction decreases the pressure(-).
5. Flush the inside of the control unit with water after use to remove any residues of aggressive products.

MAINTENANCE INSTRUCTIONS

The routine maintenance of the unit comprises the replacement of:

➥Valve pos. 29

➥Back off the four M 3X60 screws pos.54, back off the four m 6x 22 screws pos. 38.

➥Remove the diaphragm pos. 30 from the spring guide body pos. 36.

➥Clamp the piston pos. 32 and back off the screw pos.27.

➥In the meantime, check the condition of the seat pos. 8 and, if it needs to be replaced, proceed as follows:

Back off the adaptor pos. 4.
Remove the spacer pos. 6.
Remove the stainless steel seat pos. 8.

BY-MATIC 50

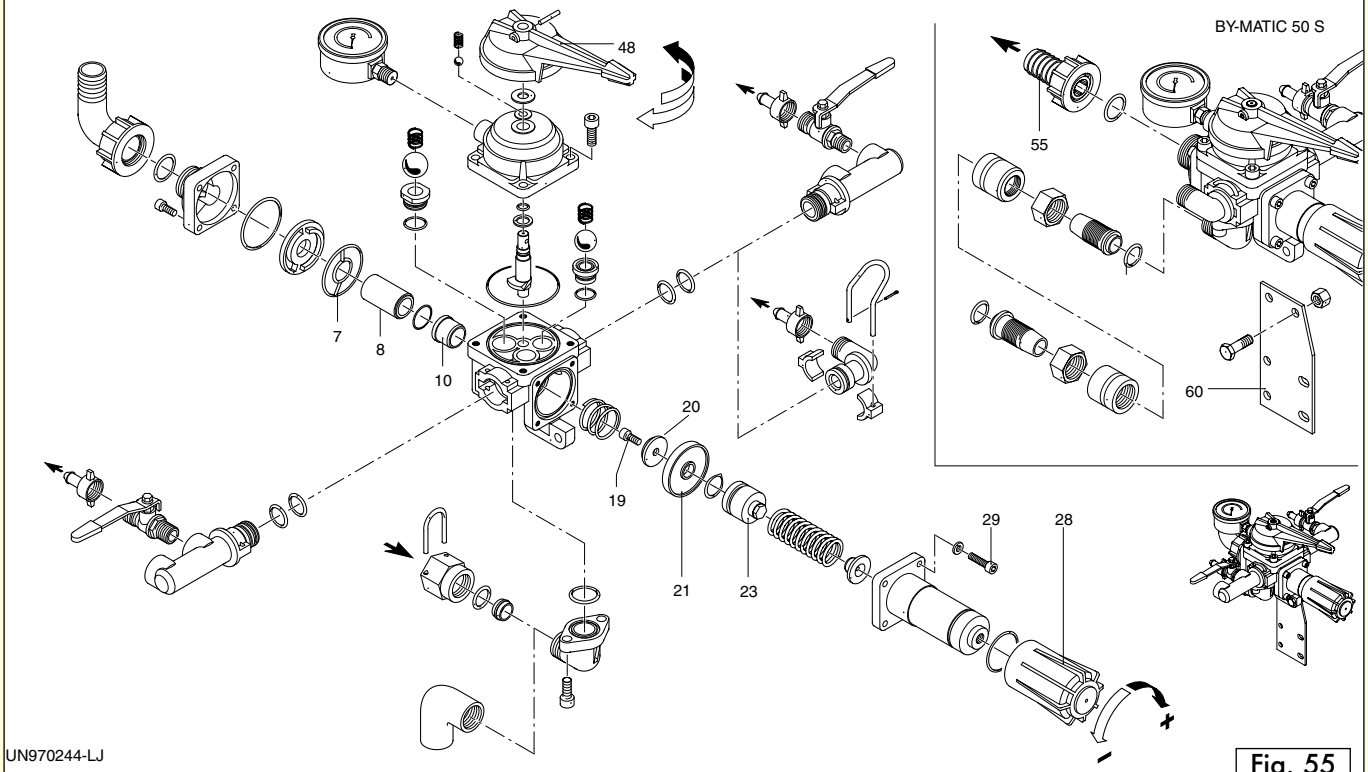


Fig. 55

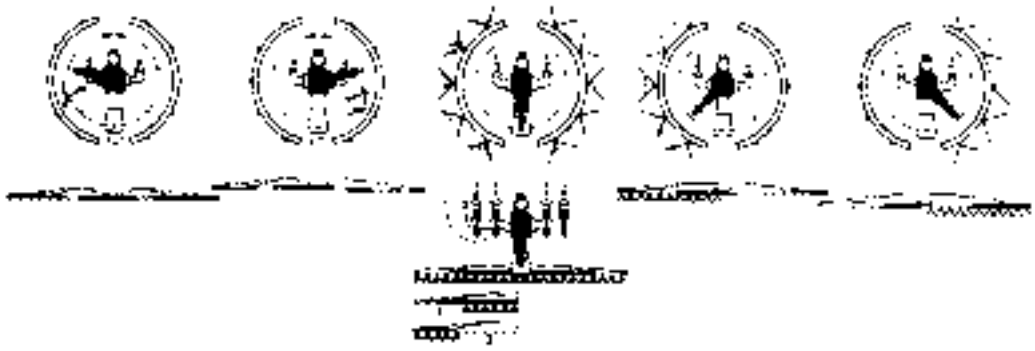


Fig. 56

INSTALLATION /OPERATING INSTRUCTIONS
BY MATIC 50 REMOTE CONTROL UNIT

DESCRIPTION AND APPLICATION

The BY MATIC 50 control unit is used for regulating the working pressure for the distribution of liquids in sprayers.
The call-out numbers are referred to the exploded view of the product.
BY MATIC 50 consists of a diaphragm pressure regulating valve, which can be manually calibrated using knob (28). The same body also incorporates a quick return valve. The pressurized outlet toward the loads is channelled via two 1-way manifolds, or on request via two 2-way manifolds for a total of 4 ways.

ASSEMBLY

1. Securely assemble the bracket (60).
2. Assemble the quick couplings to the high pressure hose connected to the pump, then connect the BY MATIC 50 to the pump outlet port.
3. Connect the return (55) to the tank, directly and without pinching.
4. Connect the high pressure hoses to the outlet valves.

OPERATING INSTRUCTIONS

1. Refer to the operating instructions of the pump.
2. Flush water through the system and check for any leaks in the pipe connections and fittings of the hydraulic circuit.
3. All the operations are actuated by the lever (48) whose functions are illustrated in the diagram below.
4. Use the knob (28) to adjust the working pressure: turn in a clockwise direction to increase the pressure(+), in an anticlockwise direction to reduce the pressure (-).
5. Flush the inside of the control unit with water after each use, to remove any residues of aggressive products.

MAINTENANCE INSTRUCTIONS

The routine maintenance of the unit involves the replacement of:

➥Valve pos. 20
➥Back off the four M 6X22 screws pos.29.
➥Remove the diaphragm pos. 21 from the guide spring body.
➥Clamp the piston pos. 23 and back off the m 6x20 screw pos. 19.
➥In the meantime, check the state of the guide seat pos. 10, and if it needs to be replaced proceed as follows:

- *Back off the four M 6x 25 screws.*
- *Remove the spacer disc pos. 6 + gasket pos. 7 + spacer pos. 8.*
- *Remove the valve seat pos. 10.*