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Combi

Instructions book

674543-GB-98/1



EC Declaration of Conformity

Manufacturer,

HARDI INTERNATIONAL A/S
Helgeshøj Allé 38
DK 2630 Taastrup
DENMARK

Importer,

declare that the following product;

.....
.....

Adhere extra shipping package labels to inside cover.


A. was manufactured in conformity with the provisions in the COUNCIL DIRECTIVE of 14 June 1989 on mutual approximation of the laws of the Member States on the safety of machines (89/392/EEC as amended by directives 91/368/EEC and 93/368/EEC) with special reference to Annex 1 of the Directive on essential safety and health requirements in relation to the construction and manufacture of machines.

B. was manufactured in conformity with the standards current at that time that implements a harmonised standard in accordance with Article 5 (2) and other relevant standards.


















Taastrup 1.1.98

HARDI INTERNATIONAL A/S

Operator safety

Watch for this symbol . It means WARNING, CAUTION, NOTE. Your safety is involved so be alert!

Note the following recommended precautions and safe operating practices.

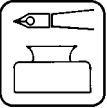
-  Read and understand this instruction book before using the equipment. It is equally important that other operators of this equipment read and understand this book.
-  Local law may demand that the operator be certified to use spray equipment. Adhere to the law.
-  Pressure test with clean water prior to filling with chemicals.
-  Wear protective clothing.
-  Rinse and wash equipment after use and before servicing.
-  Depressurize equipment after use and before servicing.
-  Never service or repair the equipment whilst it is operating.
-  Disconnect electrical power before servicing.
-  Always replace all safety devices or shields immediately after servicing.
-  If an arc welder is used on the equipment or anything connected to the equipment, disconnect power leads before welding. Remove all inflammable or explosive material from the area.
-  Do not eat, drink or smoke whilst spraying or working with contaminated equipment.
-  Wash and change clothes after spraying.
-  Wash tools if they have become contaminated.
-  In case of poisoning, seek doctor or ambulance. Remember to identify chemicals used.
-  Keep children away from the equipment.
-  Do not attempt to enter the tank.
-  If any portion of this instruction book remains unclear after reading it, contact your HARDI dealer for further explanation before using the equipment.





We congratulate you for choosing a HARDI mistblower. The reliability and efficiency of this product depend on your care. The first step is to carefully read and pay attention to this instruction book. It contains essential information for the efficient use and long life of this quality product.

As the instruction book covers all COMBI models, please pay attention to the paragraphs dealing with precisely your model. This book is to be read in conjunction with the Mistblowing Technique book.



Description

The Hardi NK COMBI mistblowers consist of pump, 600 litre tank with frame, BK operating unit, transmission shaft and blower.

The design of the pump is simple and ensures that the spray liquid does not come in contact with the vital parts of the pump.

The tank, made of highly impact-proof and chemical resistant polyethylene, has a purposeful design with no sharp edges for easy cleaning and efficient agitation. A suction filter is located at the top of the tank. This facilitates filter inspection even if the tank is filled with spray liquid. To ensure safe operation, the drain valve is also located at the top of the tank.

The BK 180 K operating unit consists of: pressure agitator, pressure regulator, on/off function, pressure filter with pressure gauge and three distribution valves with pressure equalization.

The blower is equipped with a centrifugal fan. The efficient design of the blower housing permits the use of relatively small tractors (minimum for COMBI SWING is 24 kW). A disengagement coupling at the fan permits agitation under transport or usage of spray guns. The blower housing outlet is divided into spouts and in each spout ceramic nozzles are placed to measure, atomize and distribute the spray liquid in the air stream.

The blower direction can be adjusted hydraulically.

A protection guard for the blower housing is mounted at the back of the sprayer.

COMBI-1/2/3/5

The design of the blower housing permits use of different types of spouts, each spout type covering a particular use.

COMBI-1 is fitted with one big spout designed for spraying trees up to 25 metres high.

COMBI-2 is fitted with two spouts thereby dispersing the liquid in a wider fan. Best suited for spraying trees up to 15 to 20 metres.

COMBI-3 is fitted with three spouts. It is best suited to ground crops where access is difficult. The different sized spouts ensure correct distribution. In calm weather conditions and suitable forward speed, spray swath of 15 metres can be achieved.

COMBI-5 is fitted with five different sized spouts. This makes it suitable for spraying of citrus, avocados, nut and large fruit trees up to 8 to 10 metres high (especially in older plantations with big row distance).

Spraying is normally carried out up and down each row.

The tilt of the blower on the above models can be adjusted hydraulically to spray trees of varying heights or to compensate for spraying on uneven ground.

COMBI SWING

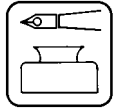
This model is particularly suited to ground crops where access is difficult. Correct distribution of the air stream and thereby spray liquid is ensured by the design of the blower housing spouts, big spout spraying the largest area, small spout spraying the smallest.

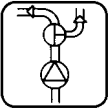
The blower unit is equipped with a hydraulic motor which can direct the spout 180° on a horizontal plane and a double-acting hydraulic cylinder which can tilt the spout 60° in a vertical plane. This allows the direction of the air stream to be altered ensuring that spraying can be carried out in the same direction as the wind and when spraying trees of varying heights.

In calm weather conditions and suitable forward speed, spray swath up to 25 metres can be achieved.

A foot board and bracket for possible mounting of a hose reel is located on the side of the tank.

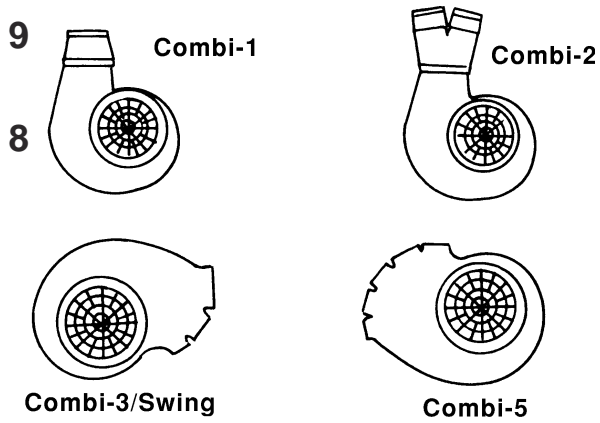
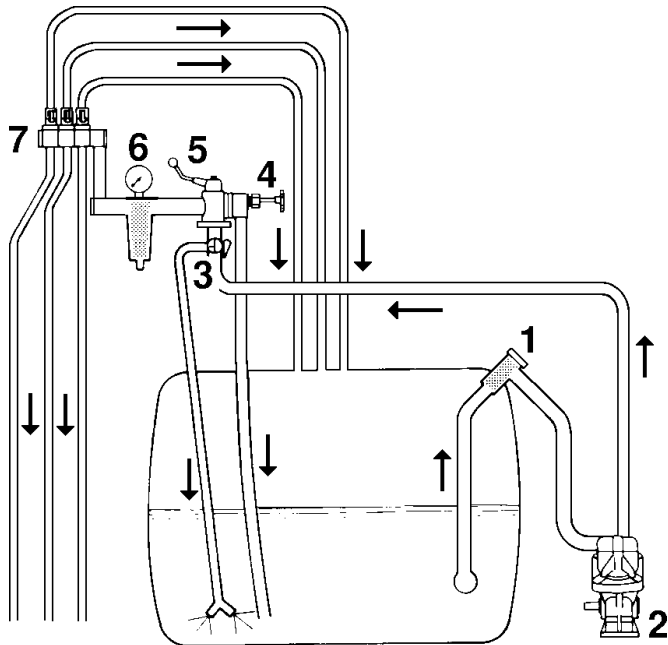
An identification plate fitted on the frame indicates model, year of production and serial number, and country of origin.





Operation diagram

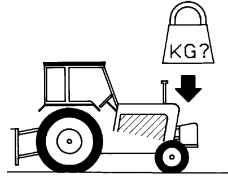
- 1. Suction filter
- 2. Pump
- 3. Pressure agitation valve
- 4. Pressure regulation valve
- 5. On/off valve
- 6. Pressure filter and gauge
- 7. Distribution valve with pressure equalization
- 8. Blower
- 9. Spout



Connecting the sprayer

The sprayer is designed for three-point suspension and equipped with 28 mm pivots (category II).

WARNING: Note the weight of the sprayer. See section on Technical specifications.

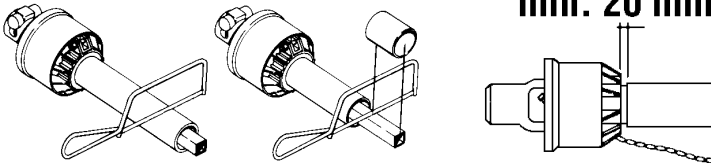


Generally it is recommended to:

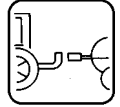
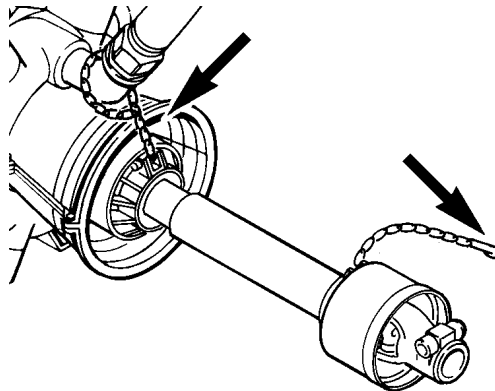
1. Add ballast to front of tractor.
3. Increase tyre pressure (see tractor instruction book).
4. Travel at slower speeds when driving to the field with a full tank.
Remember your tractor will have decreased braking efficiency, particularly when tank is full.
Be careful when filling/lifting the sprayer for the first time.

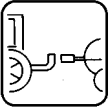
Transmission shaft

When connecting the sprayer to the tractor the length of the transmission shaft should be checked and if necessary shortened. There should be at least **10 mm** free play between male and female parts when the shaft is at its minimum length.

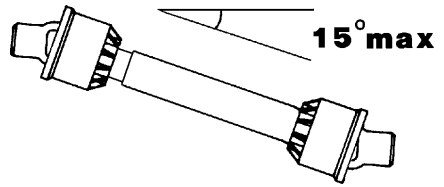


It is important for the personal safety of the operator that the transmission shaft is intact. The protection guards must cover the whole shaft. This includes the universal cross covers at each end of the shaft. The chains are connected so that the protection guards do not rotate with the shaft.





To ensure long life of the transmission shaft, try to avoid working angles greater than 15°.

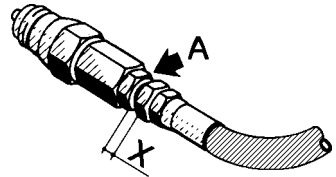


Hydraulics

Hydraulic connection necessitates a double-acting outlet for the spout functions. Note that the hydraulic system requires an oil capacity of approx. 2 litres and a min. pressure of 130 bar.

Hydraulic regulation of blower (COMBI-SWING only)

On one hydraulic hose, there is an adjustable valve for regulation of speed of the hydraulic movements. Should the spout move violently or too slowly, the valve must be adjusted so that the spout operates smoothly.



Lock nut **A** is loosened, and the distance "X" is adjusted by turning the snap coupling.

BE CAUTIOUS WITH INITIAL USE OF THE HYDRAULIC SYSTEM. THERE MAY BE AIR IN THE SYSTEM AND THIS MAY CAUSE VIOLENT MOVEMENTS OF THE SPOUT. THEREFORE TAKE CARE THAT NO PERSONS OR OBJECTS ARE HURT OR DAMAGED WHILST TESTING.

Roadworthiness

When driving on public roads and other areas where the highway code applies, or areas where there are special rules and regulations for marking and lights on implements, you should observe these and equip implements accordingly.



Operating instructions

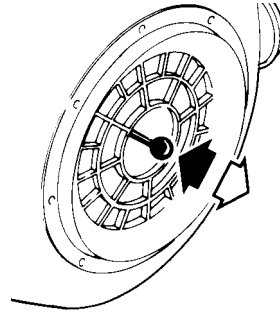
Fan engagement

The handle for engaging/disengaging the fan is in the middle of the air intake on the blower unit. Push handle IN to engage fan. Pull handle OUT to disengage fan.

NOTE: See also section on V-belt tension.

Use of spray guns or tank filling only needs the pump operating and it is therefore practical to disengage the fan.

IMPORTANT: BOTH PUMP AND FAN WHEEL SHOULD BE STATIONARY WHEN ENGAGING/DISENGAGING FAN.

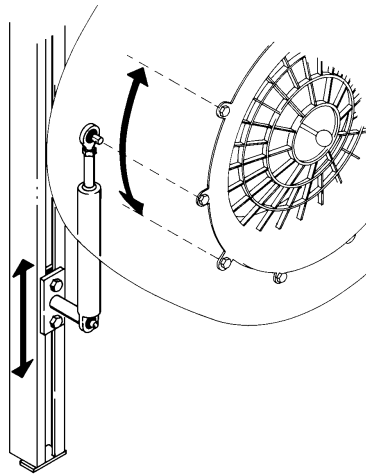


Spout operation

COMBI-1/2/3/5

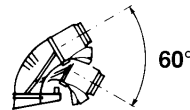
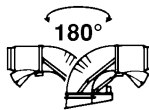
The spout tilt is adjusted hydraulically by activating the hydraulic lever on the tractor.

Should the angle of operation be inappropriate, the fixing point of the hydraulic cylinder to the frame may furthermore be moved. It can be relocated further up/down or, on the opposite side should the blower need to be rotated.

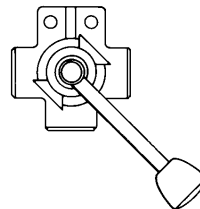
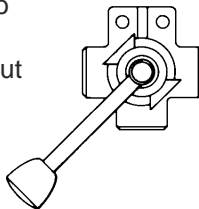


COMBI-SWING

The spout is adjusted hydraulically by activating the hydraulic lever on the tractor.

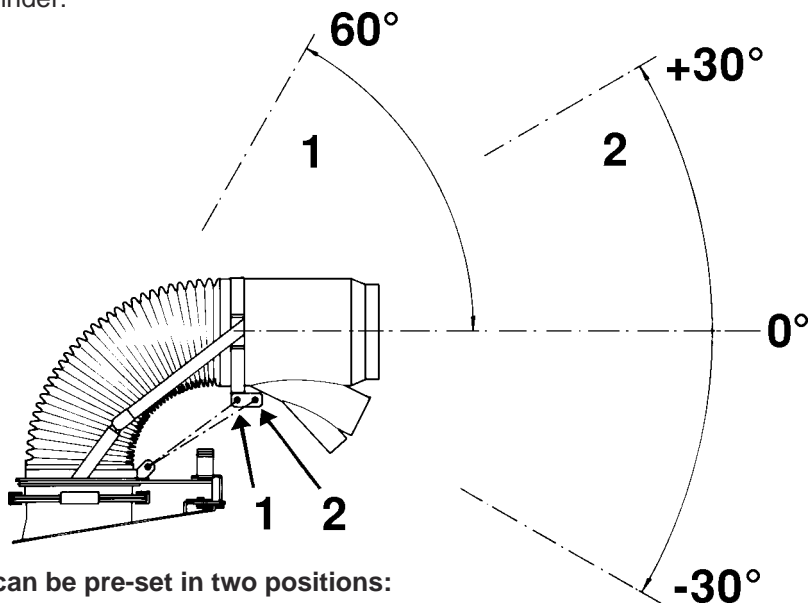


A directional valve to pre-set between the spout tilting and spout turning functions is located under the operating unit.





The turning function is done by a hydraulic motor turning the spout max. 180°. The tilting function is done by a double-acting hydraulic cylinder:



It can be pre-set in two positions:

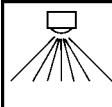
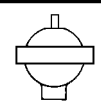
Position 1: inner hole for tilting 0° to +60°.

Position 2: outer hole for tilting -30° to +30°.



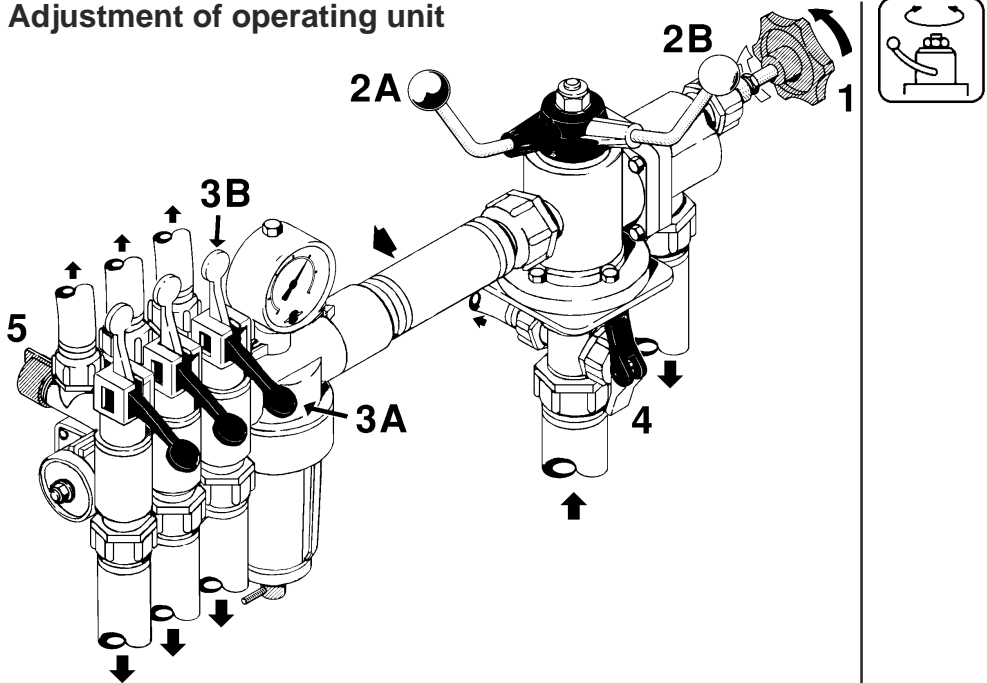
Pulsation damper adjustment

The air pressure in the pulsation damper is preset at the factory to 2 bar covering spray working pressures between 3 and 15 bar. When using spray pressures outside this range, the air pressure should be set as shown in the diagram.

	
bar	bar
1.5 - 3	0 - 1
3 - 15	1 - 3

The diagram is also embossed on the damper.

Adjustment of operating unit



1. Open or close lever **4** depending on whether pressure agitation is required. (Remember pressure agitation takes between 5 to 10% of pump output).
2. Turn main on/off handle **2** to spraying position **A**.
3. Set all hand levers **3** on the distribution valve to spraying position **A**.
4. Turn the pressure regulation valve **1** anti-clockwise to minimum pressure setting.
5. Put the tractor in neutral and set the P.T.O. revolutions to 540 r/min. (If maximum blower output is not necessary the revolutions may be set at less than 540 P.T.O. r/min).
To ensure long bearing life, the tractor P.T.O. must **NOT** exceed 540 r/min.
6. Turn the pressure regulation valve **1** clockwise so that the pressure gauge indicates the recommended pressure.



Adjustment of pressure equalization valves

7. Note the pressure and place the first lever **3** on the distribution valve in position **B** (off position).

8. Turn the corresponding adjusting screw **5** until the pressure gauge again shows the same pressure (turn the screw clockwise for higher pressure, anti-clockwise for lower pressure).

9. Adjust the other sections of the distribution valve in the same way.

NOTE: Hereafter adjustment of pressure equalization will only be needed if you change to nozzles of other capacities.

Operating the unit whilst spraying

To stop the entire liquid flow to the spout, turn the handle **2** to position **B**. This takes the pressure from the pump. The liquid will then return to the tank via the return system. The anti-drip valves ensure instantaneous closing of all nozzles. In order to close part of the spout, move lever **3** of the distribution valve to position **B** (off position) for the section or sections to be closed. The pressure equalization device ensures that the pressure does not rise in the sections which remain open.



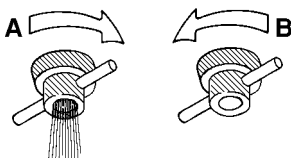
Drain valve operation

Operating unit drain valve

The operating unit has an in-built pressure filter. It is not necessary to dismantle the filter to clean it. When cleaning the sprayer (clean water circulating in tank), open the drain valve to flush the filter.

To open : **A**

To close : **B**



Tank drain valve

To open : **A**

To close : **B**



Calibration - see Mistblowing Technique book.

Standard calibration

A standard set of nozzles is supplied with the sprayer. Other nozzles and combination of nozzles can be used so the output and drop size suits the intended spray task.

Standard Spraying examples and Nozzle set tables are given in the following pages. Colour codes see page 13.



Spraying examples			Combi-1		
Spray swath (m)	l/ha	km/h	Total l/min	Nozzle set	bar
10	200	3.0	10.0	1	9.6
		4.0	13.3	2	5.0
	400	3.0	20.0	3	6.7
		4.0	26.7	3	12.0
	600	2.0	20.0	3	6.7
15	200	2.0	10.0	1	9.6
		3.0	15.0	2	6.4
	400	2.0	20.0	3	6.7
		3.0	30.0	3	15.0
	600	1.5	22.5	3	8.5
20	400	1.5	20.0	3	6.7
		2.0	26.7	3	12.0
	600	1.5	30.0	3	15.0
25	400	1.5	25.0	3	10.5

	Nozzle set						Combi-1		
	1	2	3*	4	5	6			
	1	G	BL	BL					
	2	R	G	BL					

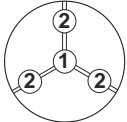
* Standard



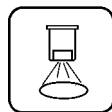
Spraying examples

Combi-2

Spray swath (m)	l/ha	km/h	Total l/min	Nozzle set	bar	
10	400	2.0	13.3	1	6.2	
		4.0	26.7	3	9.1	
	600	2.0	20.0	2	8.2	
		3.0	30.0	3	11.5	
	800	2.0	26.7	3	9.1	
15	200	2.0	10.0	1	3.5	
		4.0	20.0	2	8.2	
	400	1.5	15.0	1	7.8	
		3.0	30.0	3	11.5	
	600	1.5	22.5	2	10.3	
20	400	1.5	20.0	2	8.2	
		2.0	26.7	3	9.1	
	600	1.5	30.0	3	11.5	

	Nozzle set			Combi-2		
	1	2	3*	4	5	6
1	G	BL	BL			
2	R	G	BL			

* Standard



Spraying examples Combi-3 & Swing

Spray swath (m)	l/ha	km/h	Total l/min	Nozzle set	bar
10	200	3.0	10.0	1	7.0
		6.0	20.0	2	4.5
	400	3.0	20.0	2	4.5
		6.0	40.0	3	10.5
	600	3.0	30.0	3	5.9
		4.5	45.0	3	13.3
12	63	5.6	7.1	4	3.0
	81	5.6	9.1	4	5.0
	126	2.8	7.1	4	3.0
	163	2.8	9.1	4	5.0
15	200	4.0	20.0	5	5.6
	400	2.0	20.0	5	5.6
		3.0	30.0	6	8.5
	600	2.0	30.0	6	8.5
20*	200	1.5	10.0	7	5.1
		3.0	20.0	8	8.2
	400	1.5	20.0	8	8.2
		3.0	40.0	9	9.5
	600	1.5	30.0	9	5.4
25*	200	2.5	20.8	8	8.2
	400	2.5	41.6	9	10.3

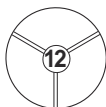
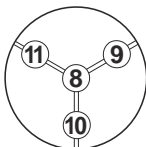
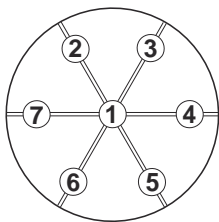
* Combi Swing

Colour Codes

L	Lilac
BR	Brown
Y	Yellow
O	Orange
R	Red
G	Green
BL	Blue



** Larger nozzle generally used



Nozzle set Combi-3 & Swing

	Nozzle set			Combi-3 & Swing								
	< 12m			12 - 18m			18 - 25m					
	1	2	3	4	5	6*	7	8	9	10	11	12
1**	O	BL	BL	BL	BL	BL	-	BL	BL			
2	Y	G	BL	BL	G	BL	R	G	BL			
3	Y	G	BL	BL	G	BL	R	G	BL			
4	Y	G	BL	-	G	BL	R	G	BL			
5	Y	G	BL	-	G	BL	R	G	BL			
6	Y	G	BL	-	G	BL	R	G	BL			
7	Y	G	BL	-	G	BL	R	G	BL			
8**	Y	G	BL	G	R	R	O	R	BL			
9	BR	R	G	-	O	O	-	-	BL			
10	BR	R	G	-	O	O	-	-	BL			
11	BR	R	G	-	O	O	-	-	BL			
12	Y	G	BL	-	R	R	BR	O	G			

* Standard



Spraying examples			Combi-5		
Spray swath (m)	l/ha	km/h	Total l/min	Nozzle set	bar
6	400	2.0	8.0	1	5.3
		4.0	16.0	2	3.4
	600	2.0	12.0	1	11.9
		4.0	24.0	2	7.6
	1000	2.0	20.0	2	5.3
3.0		30.0	3	9.7	
8	400	2.0	10.7	1	6.3
		4.0	21.3	2	6.0
	600	2.0	16.0	2	3.4
		4.0	32.0	3	11.0
	1000	2.0	26.7	3	7.2
10	400	3.0	20.0	2	5.3
		4.0	26.7	3	7.2
	600	2.0	20.0	2	5.3
		3.0	30.0	3	9.7
	1000	2.0	33.3	3	12.0

		Combi-5					
		1	2*	3	4	5	6
1		BL	3xG	3xBL			
2		3xO	3xBL	3xBL			
3		G	BL	BL			
4		R	BL	BL			
5		O	G	G			

* Standard

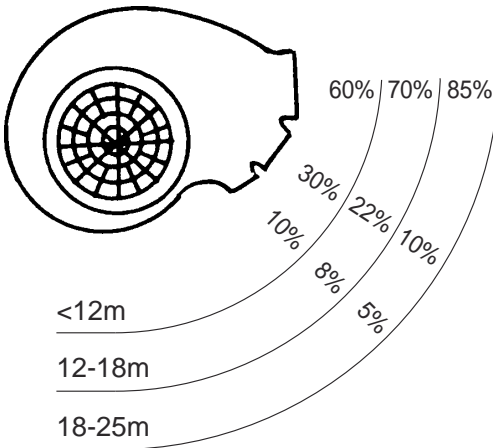
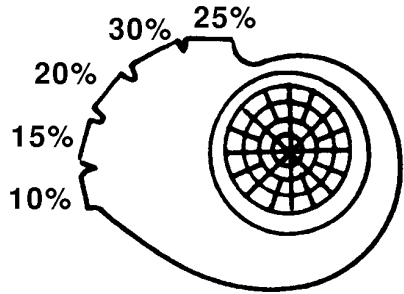
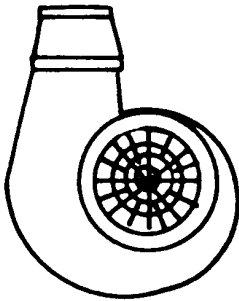


If you have a specific spray task not covered in the **Spraying examples** the Mistblowing Technique book will also assist you in finding the nozzle set best suited to that task.

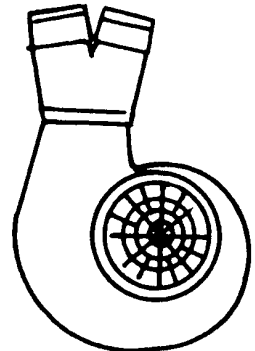
As a rule, a nozzle combination must be chosen to give the following liquid distribution.

The blanks in the “**Nozzle set**” and the blank “**Spraying examples**” can be used to record the specific spray task so you can refer back to it in the future.

100%



50% 50%



Spraying examples



Spray swath (m)	l/ha	km/h	Total l/min	Nozzle set	bar



Maintenance

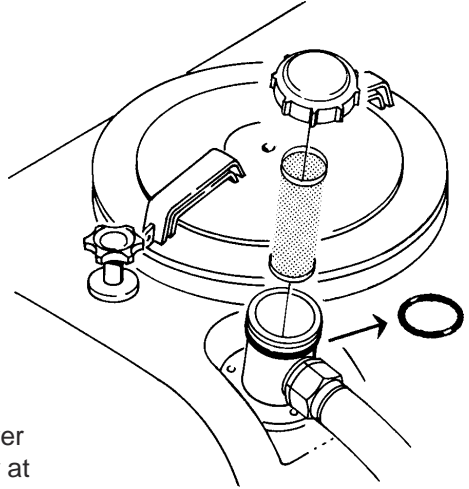
In order to derive full benefit for many years from the sprayer, the following few but important rules should be kept:



Filters

Clean filters ensure :

- Sprayer components such as valves, diaphragms and operating unit are not hindered or damaged during operation.
- Nozzle blockages do not occur whilst spraying.
- Long life of pump. A blocked suction filter will result in pump cavitation.



The main filter protecting sprayer components is the suction filter at the top of the tank.

Check it regularly.

Ensure the O-ring on filter housing is in good condition and lubricated.

The operating unit has an in-built pressure filter. See section on Drain valve operation.



V-belt tension

Correct belt tension is important for efficient power transfer. Under tensioned belts will slip and overheat reducing belt life whilst over tensioned belts will reduce belt and bearing life.

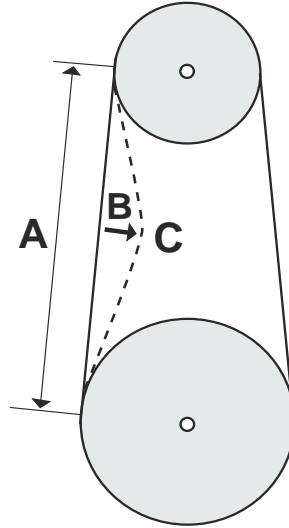
Check the V-belts regularly within the first 24 working hours as they need to be run in. Tighten if necessary. Thereafter check every 40 hours.

A quick visual check can be done by running the transmission for a few minutes and then noting the “bow” of the V-belts on the slack side. A faint “bow” should be noted.



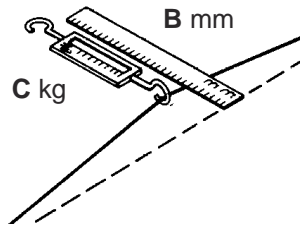
A V-belt tension tester or the following method can be used for more precise adjustment.

1. Remove guards if fitted.
2. Locate centre point $\frac{1}{2}$ **A** between pulleys.
3. Using a spring scale, check force **C** necessary to deflect the V-belt the described distance **B** (see table below). If room does not permit, then deflect V-belt outward.
4. Adjust if necessary (see following section) and replace guards.



COMBI 1/2/3/5	A mm	B mm	C kg min. max.
Pump	24	3.6	2.1 3.1
Blower	80	12.0	1.8 2.7

COMBI SWING	A mm	B mm	C kg min. max.
Pump	24	3.6	2.1 3.1
Blower	60	9.0	2.0 3.0
Spout	40	-	6.0 *



* If over-tightened, the spout will jam.



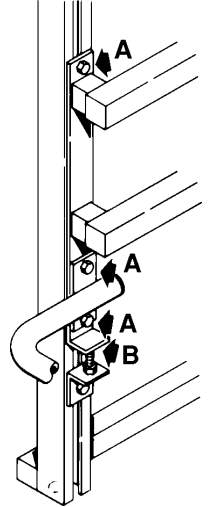
Adjustment of V-belts

Pump

The pump drive V-belts are tensioned by using the adjusting bolts at the foot of the pump. The pump crankshaft must remain parallel to the blower drive shaft.

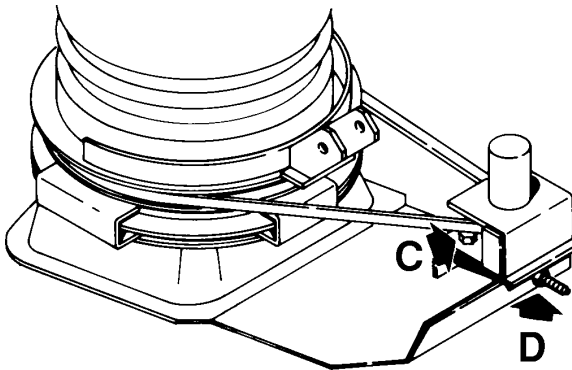
Blower unit

The blower drive V-belts are tensioned by raising or lowering the blower unit. Nuts **A** on the blower suspension are loosened, and the belt tension is adjusted by the adjusting bolts **B**.



Combi Swing spout

To alter tension, loosen bolt **C** below the V-belt pulley. Adjust by means of nut **D**.

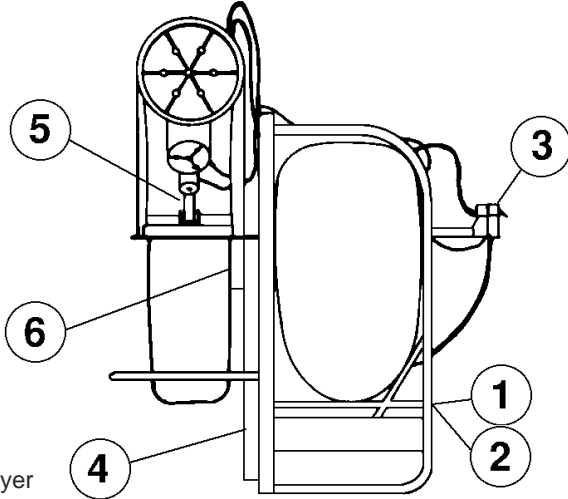


**DO NOT FORGET TO TIGHTEN ALL BOLTS ANDDD
COUNTERNUTS (AND REPLACE GUARDS) AFTER ADJUSTMENT**

Lubrication

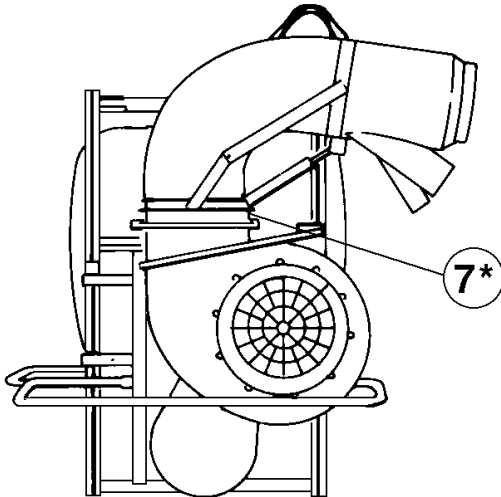
Recommended lubrication is shown in following tables. Use ball bearing grease (lithium grease No. 2).

NOTE: If the sprayer is cleaned with a high pressure cleaner or it has been used to spray fertilizer, we recommend lubrication of the entire machine.





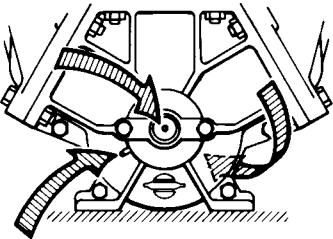
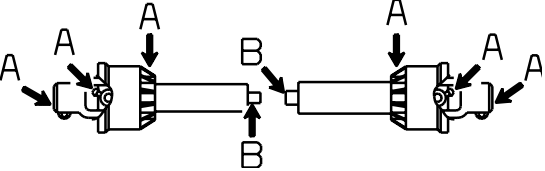
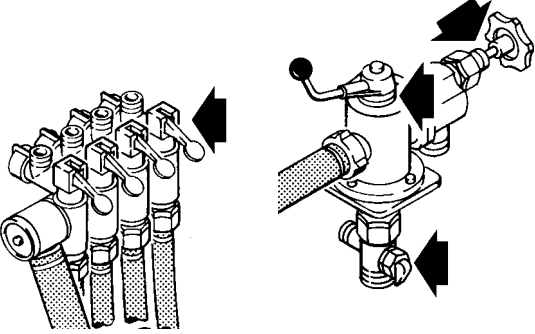
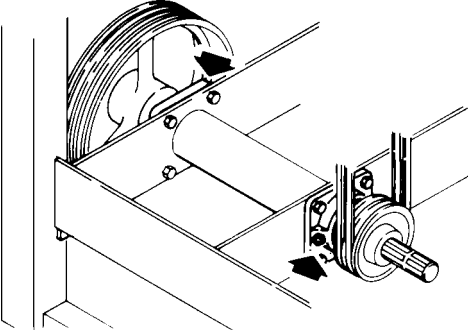






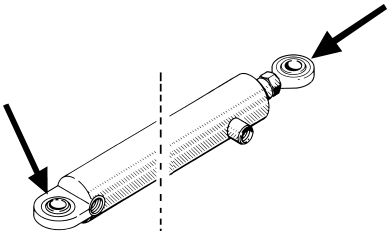
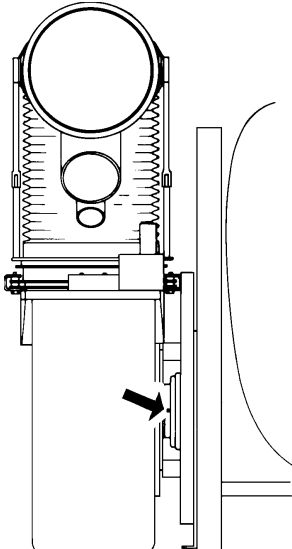
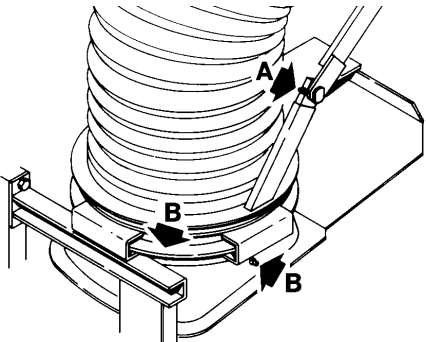
POS. Position on sprayer

-  Oil
-  Grease
-  Operation hours
-  Page to find more information
-  Off-season protection



7* Combi Swing

POS.					
1		X	40		24
2		X X	12 40		5-6
3	X		20		9 10
4		X	40		18 19

POS.					
5	X		40		7 8
6		X	40		7 8 18
7 A B		X X	100 40		20



Changing valves and diaphragms

NOTE For COMBI-1/2/3/5, access to pump is easiest if the tank is first removed.

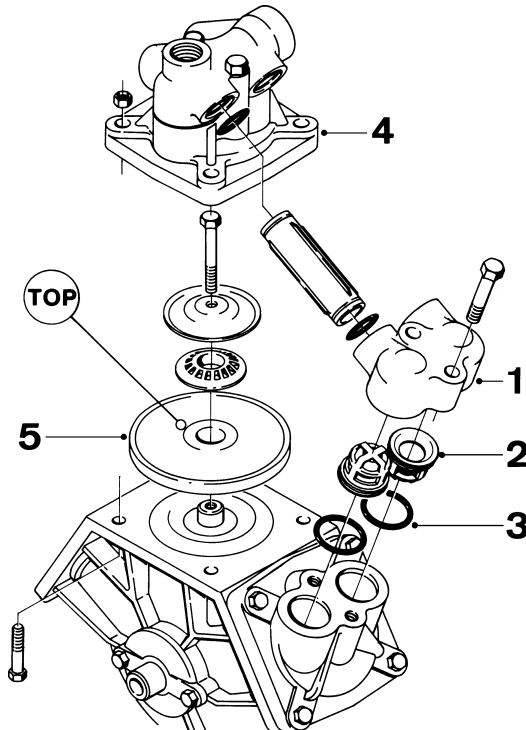
1. Disconnect hoses paying attention to not loose O-rings.
2. Undo the tank straps.
3. Tank can now pushed out of the frame.

Valves

Dismantle valve compartment **1**. Before changing the valves **2** note the orientation of the valves so that they may be replaced correctly. It is recommended to use new O-rings **3** when changing or checking the valves.

Diaphragms

Remove the diaphragm cover **4** after having dismantled the valve compartment as indicated above. Remove bolt **5**. The diaphragm **6** may then be changed. If fluids have reached the crankcase, re-grease the pump thoroughly. Check also the drain hole at bottom of pump is not blocked.

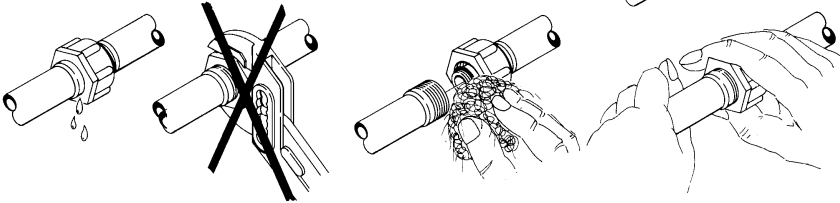


Fittings

Poor seals usually result from;

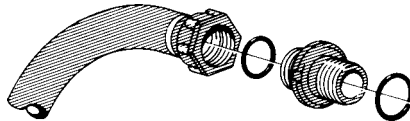
- missing O-rings or gaskets
- damaged or incorrectly seated O-rings
- dry or deformed O-rings or gaskets
- foreign bodies

Therefore, in case of leaks: **DO NOT** over-tighten, disassemble, check condition and position of O-ring or gasket, clean lubricate and then reassemble.



For radial connections only hand tighten them.
The O-ring must be greased **ALL THE WAY ROUND** before refitting.

For axial connections, a little mechanical leverage may be used.



Off-season storage

When the spraying season is over you should devote some extra time to the sprayer before it is put away for the winter.

Hoses

Check that none of the hoses are caught or have sharp bends.

A leaky hose can give an annoying delay in the middle of the spraying job. Therefore check all the hoses and change if there is any doubt about the durability.

Paint

Some chemicals are very rough on paints. It is therefore well advised to remove rust, if any, and then touch up the paint.





Tank

Check that no chemical residues are left from the last spraying. Chemical residues must not be left in the tank for a long time. It will reduce the life of the tank.

Transmission shaft

Check that the transmission shaft shields fulfill their security purpose, e.g. that shields and protective tubes are intact.

Anti-freeze precaution

If the sprayer is not stored in a frost-proof place you should take the following precautions: Put at least 10 litres of 33% anti-freeze mixture in the tank and let the pump run a few minutes so that the entire system including nozzle tubes are filled. Remove the glycerine filled pressure gauge and store it frost free in vertical position. The anti-freeze solution also hinders the O-rings and gaskets from drying out.



Operational problems

In cases where breakdowns have occurred the same factors always seem to come into play:

- Minor leaks on the suction side of the pump will reduce the pump capacity or stop the suction completely.
- A clogged suction filter will hinder or prevent suction so that the pump does not operate satisfactorily.
- Clogged up pressure filters will result in increasing pressure at the pressure gauge but lower pressure at the nozzles.
- Foreign bodies stuck in the pump valves with the result that these cannot close tightly against the valve seat. This reduces pump efficiency.
- Poorly reassembled pumps, especially diaphragm covers will allow the pump to suck air resulting in reduced or no capacity.
- Hydraulic components that are contaminated with dirt result in rapid wear to the hydraulic system.

Therefore ALWAYS check:

1. Suction and pressure filters are clean.
2. Hoses for leaks and cracks, paying particular attention to suction hoses.
3. Gaskets and O-rings are present and in good condition.
4. Pressure gauge is in good working order. Correct dosage depends on it.
5. Operating unit functions properly. Use clean water to check.
6. Hydraulic components are maintained clean.



Fault	Probable cause	Control / remedy
Liquid system		
No spray from blower when turned on.	Air leak on suction.	Check if red suction lid / O-ring are sealing. Check suction tube and fittings. Check tightness of pump diaphragm and valve covers.
	Air in system.	Fill suction hose with water for initial prime.
	Suction / pressure filters clogged.	Clean filters. Check yellow suction pipe is not obstructed or placed too near the tank bottom.
Lack of pressure.	Incorrect assembly.	Agitation nozzles not fitted. Too little distance between yellow suction pipe and tank bottom.
	Pump valves blocked or worn.	Check for obstructions and wear.
	Defect pressure gauge.	Check for dirt at inlet of gauge.
Pressure dropping.	Filters clogging.	Clean all filters. Fill with cleaner water. If using powders, make sure agitation is on.
	Nozzles worn.	Check flow rate and replace nozzles if it exceeds 10%.
	Tank is airtight.	Check vent is clear.
	Sucking air towards end of tank load.	Excessive agitation, turn off. Returns inside tank need relocation.
Pressure increasing.	Pressure filters beginning to clog.	Clean all filters.
	Agitation nozzles clogged.	Check by turning agitation off / on.



Fault	Probable cause	Control / remedy
Formation of foam.	Air is being sucked into system.	Check tightness / gaskets / O-rings of all fittings on suction side.
	Excessive liquid agitation.	Turn agitation off.
		Ensure return hoses inside tank are present.
	Use foam damping additive.	
Liquid leaks from bottom of pump.	Damaged diaphragm.	Replace. See section Changing valves and diaphragms.
Hydraulic system		
Hydraulic movements are fast / slow / erratic.	Air in system.	Loosen cylinder hose connection and activate hydraulics until oil flow has no air bubbles in it (not whitish).
	Insufficient hydraulic pressure.	Check output pressure of tractor hydraulics. Minimum for sprayer is 130 bar.
	Oil in tractor reservoir low.	Check and top up if needed.
Cylinder not functioning.	Restrictor valve closed.	Reset restrictor valve.
	Restrictor blocked.	Remove hydraulic hose nipple and restrictor and clean.
Blower		
Rapid V-belt wear (smell of burnt rubber).	Belts too slack.	Check and tighten. See section on V-belt tension.
	Spout not lubricated properly.	Lubricate.
COMBI SWING Spout will not turn.	Belt too slack or too tight.	Readjust.

Technical specifications

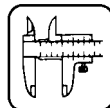
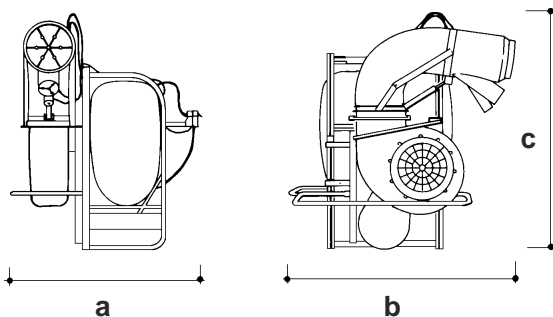
Measure and weight

Combi SWING

Measure a x b x c cm	Weight kg
140 x 200 x 195	450

Combi-1/2/3/5

Measure a x b x c cm	Weight kg
168 x 120 x 169	365



Power consumption and capacity

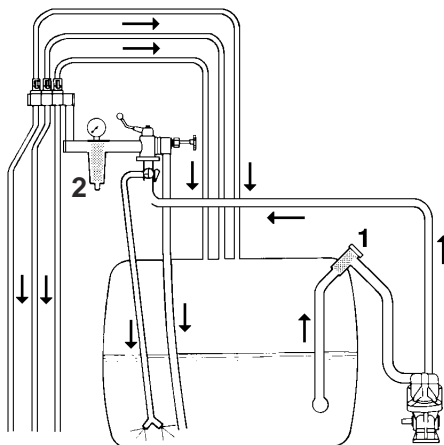
Pump model 1302

1302/9.0	r/min									
	300		400		500		540		600	
bar	l/min	kW	l/min	kW	l/min	kW	l/min	kW	l/min	kW
0	63	0.90	84	1.19	103	1.51	114	1.61	125	1.80
5	58	0.94	79	1.29	96	1.61	105	1.75	116	1.93
10	56	1.30	76	1.80	94	2.30	101	2.48	111	2.72
15	55	1.80	74	2.38	92	2.97	99	3.22	108	3.75
Omdrejninger pr min.	r/min	Kapacitet				l/min	Sugehøjdet			0,0 m
Effektbehov	kW	Max. tryk				15 bar	Vægt			35,0 kg

Filters and nozzles

Pos.	Mesh	Description
1	30	Suction filter
2	50	Pressure filter

See Nozzle set tables for standard nozzles.





Pictorial symbols



Description



Pressure



Function



Cleaning



Connection



Lubrication



Warning



Winter storage



Operating



Operational problems



Service/adjustment



Technical specifications



Liquid flow

Assembly

Packaging information

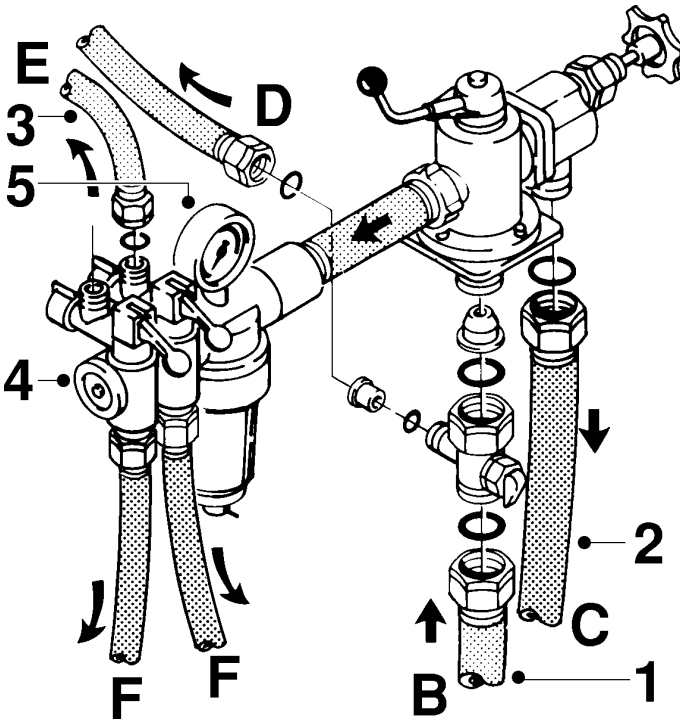
Materials used for packaging are environmentally compatible. They can be safely deposited or they can be burnt in an incinerator.

Recycling

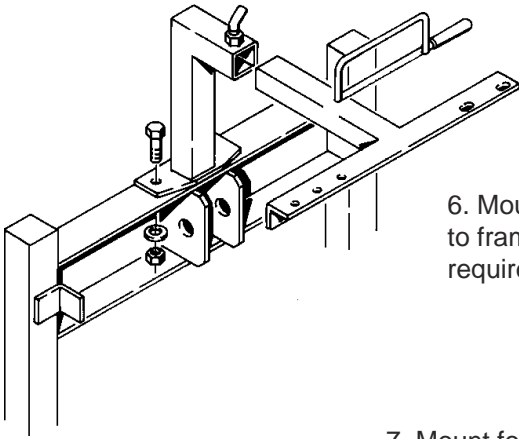
Cardboard: Can recycle up to 99% and therefore should be put into the waste collection system.

Polystyrene foam: Can be recycled. Fluorocarbons (CFC) not used in foam production.

Polyethylene: Can be recycled.

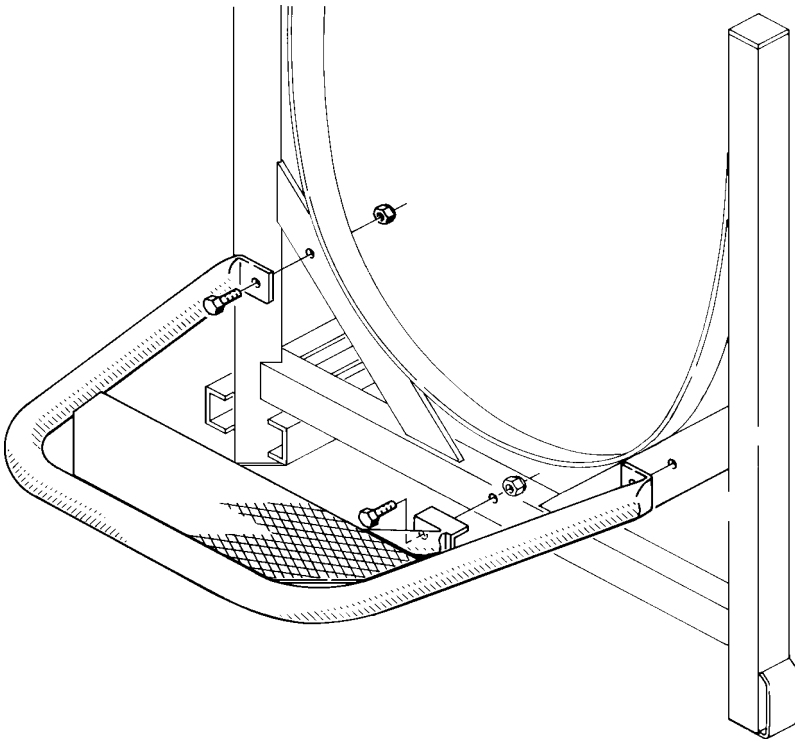


1. Connect hose (B) from pump to agitation valve.
2. Connect return hose from tank (C) to op. unit.
3. Connect pressure equalization hoses (E) to tank.
4. Tighten pin bolt nut approx. 1/2 turn to compensate for possible settling of O-rings.
5. See back of gauge. Remember to pierce casing.

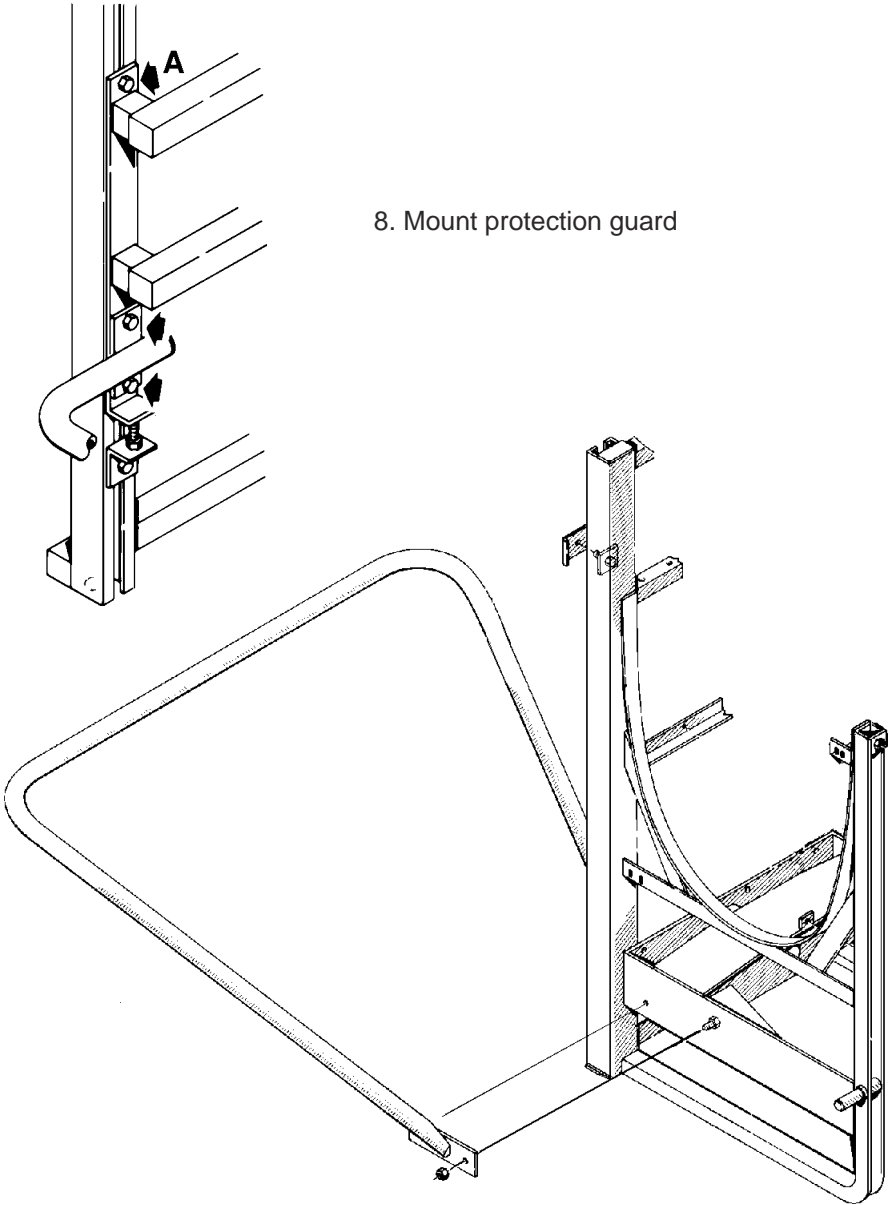


6. Mount op. unit assembly to frame. Can be shortened if required.

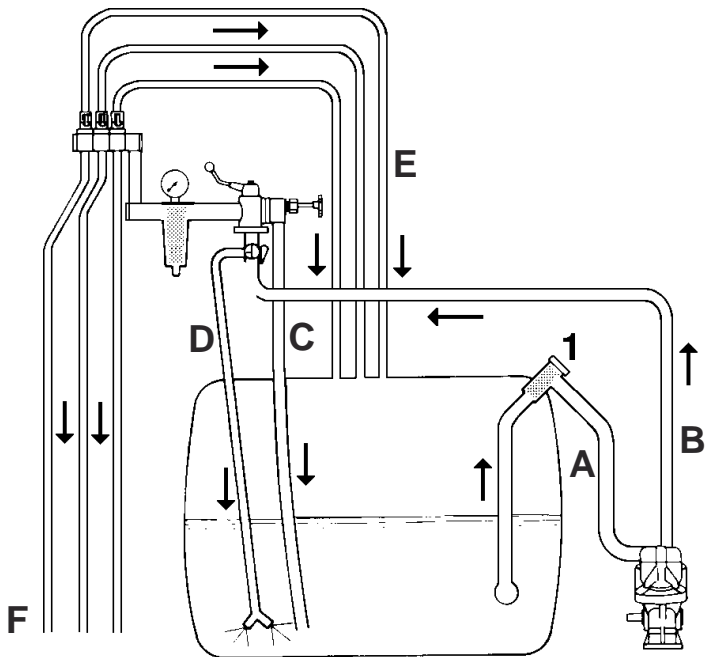
7. Mount footboard (Swing only).

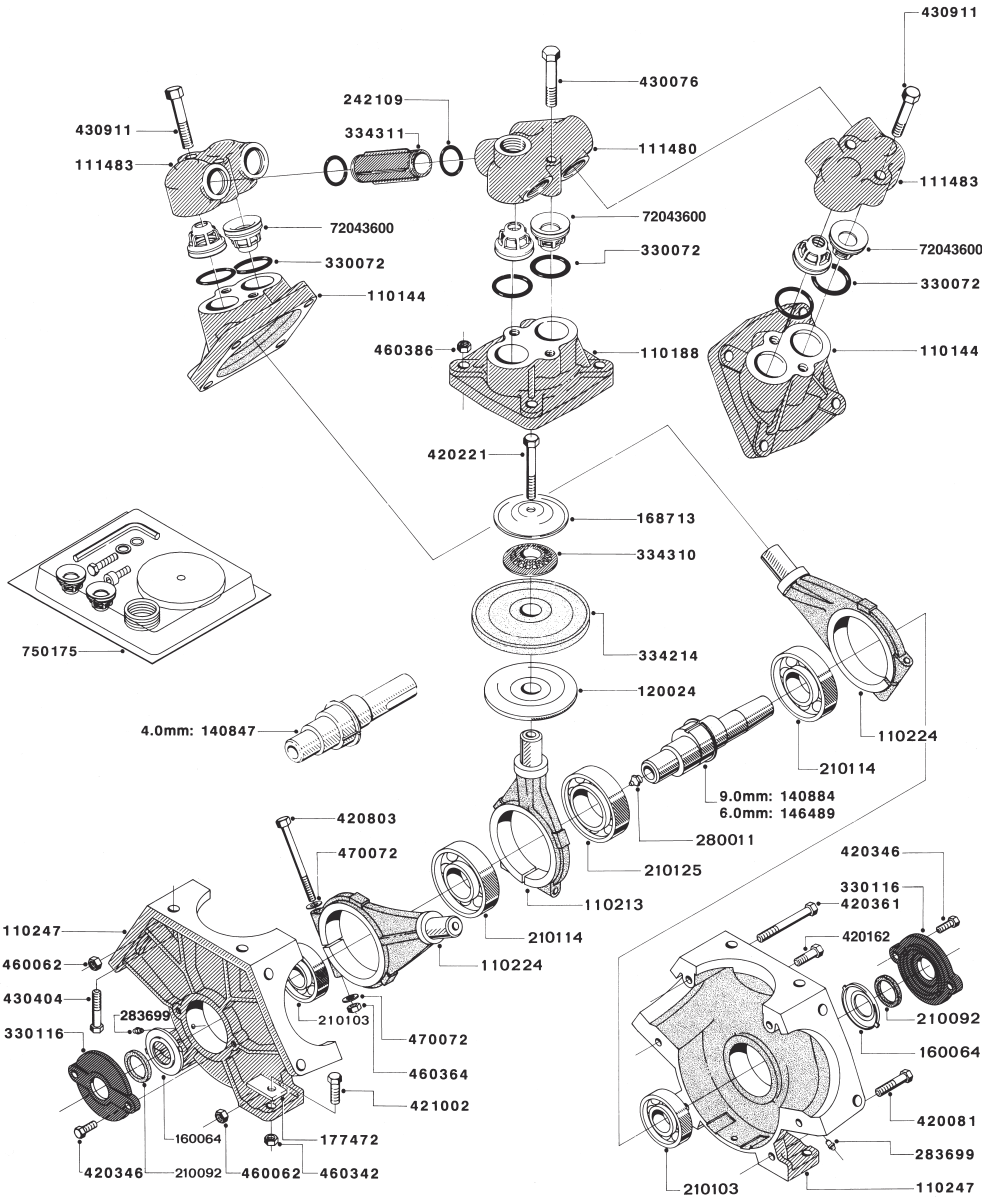


8. Mount protection guard



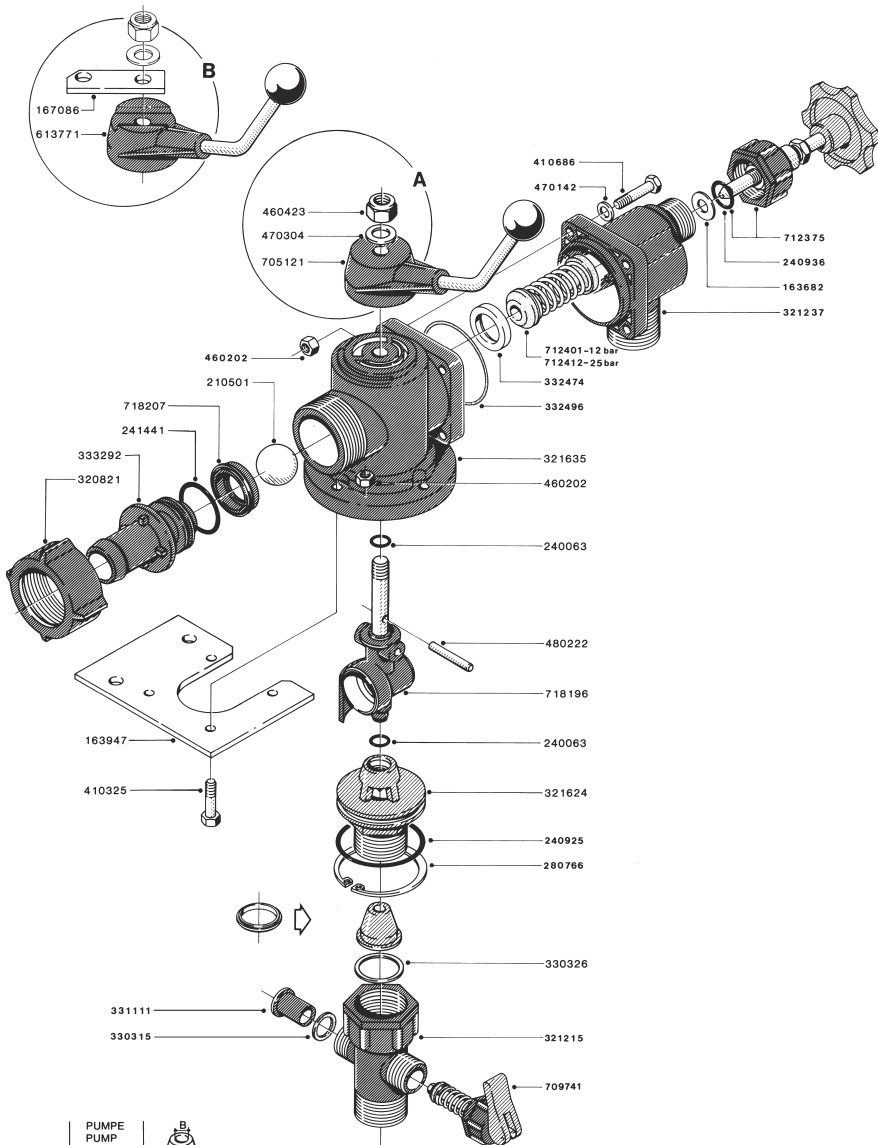
9. Check hose connections are in accordance to diagram.




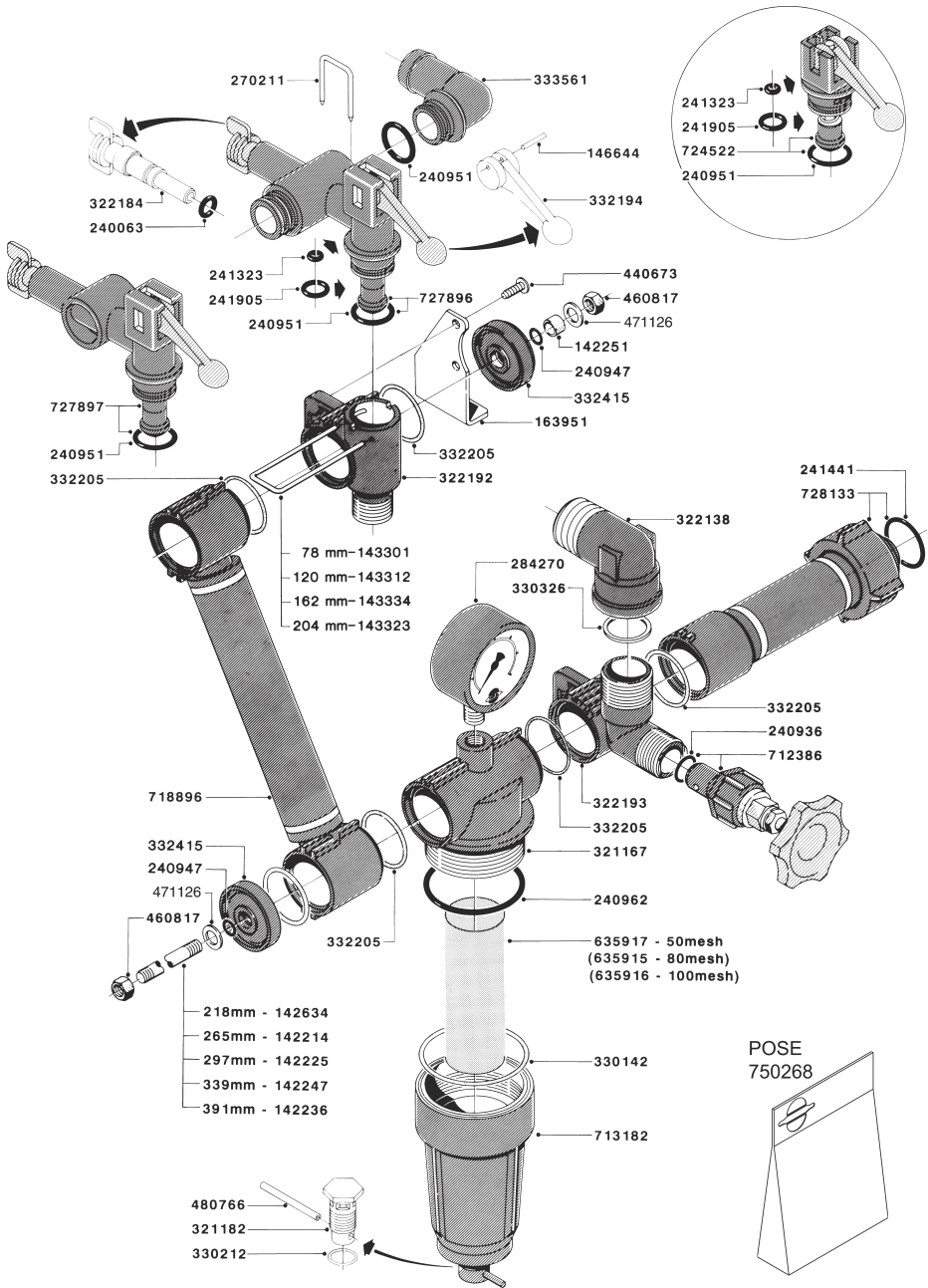


1302/foot

A12

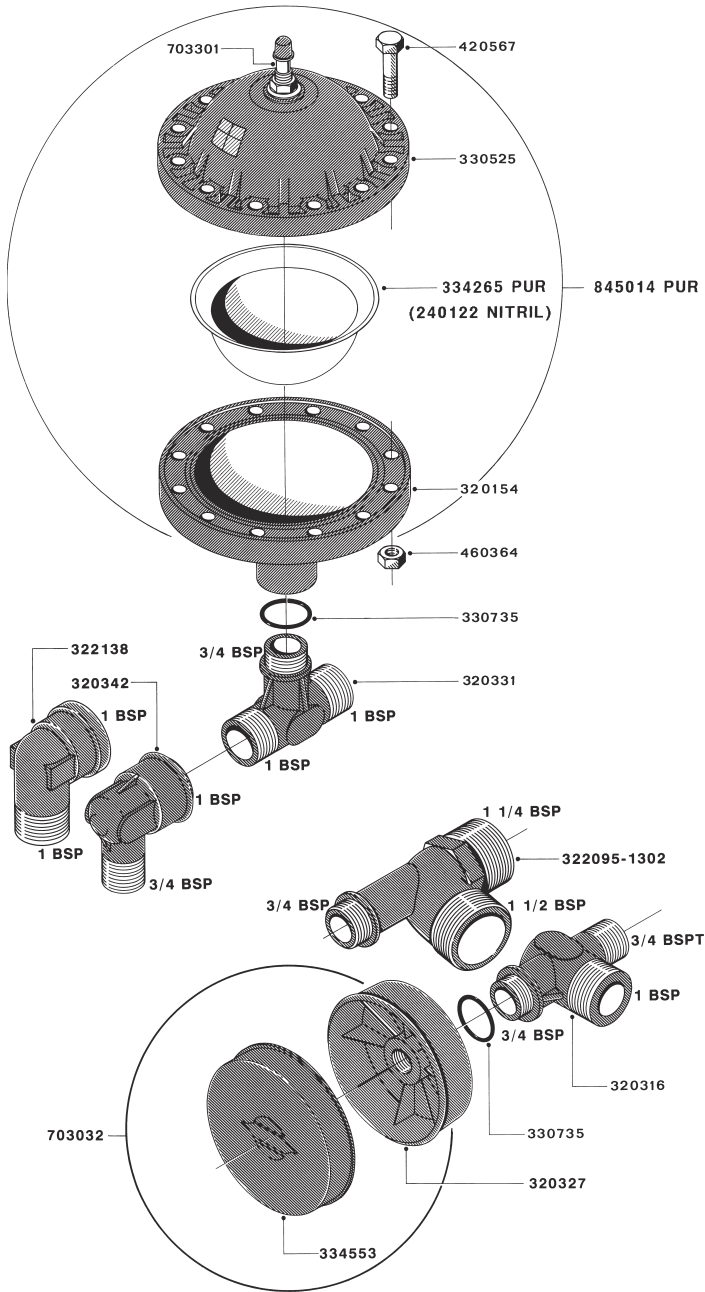


		B mm	FARVE	COLOUR	COULEUR	FARBE	COLOR	
PUMPE								
PUMP								
POMPE								
PUMPE								
BOMBA								
600	333314	5,2	BLÅ	BLUE	BLEU	BLAU	AZUL	
1202	333325	7,3	RØD	RED	ROUGE	ROT	ROJO	
1302	333336	10,0	HVID	WHITE	BLANC	WEISS	BLANCO	
361 HT	333347	9,6	ORANGE	ORANGE	ORANGE	ORANGE	ANARANJADO	
361	333351	12,5	SORT	BLACK	NOIR	SCHWARZ	NEGRO	
320 HT	333362	6	GRØN	GREEN	VERT	GRÜN	VERDE	
462								145305



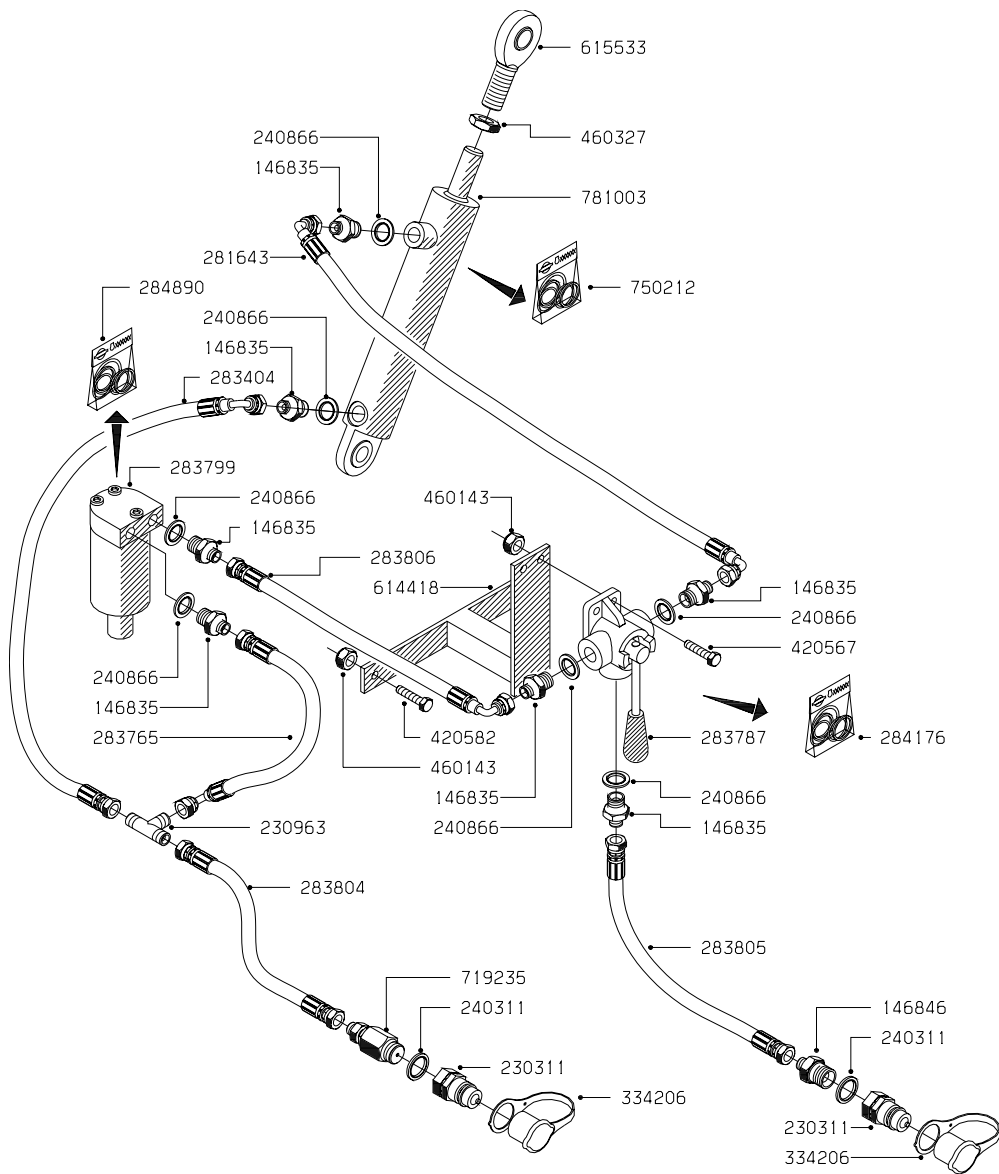
Distributor BK 180K (92)

B10



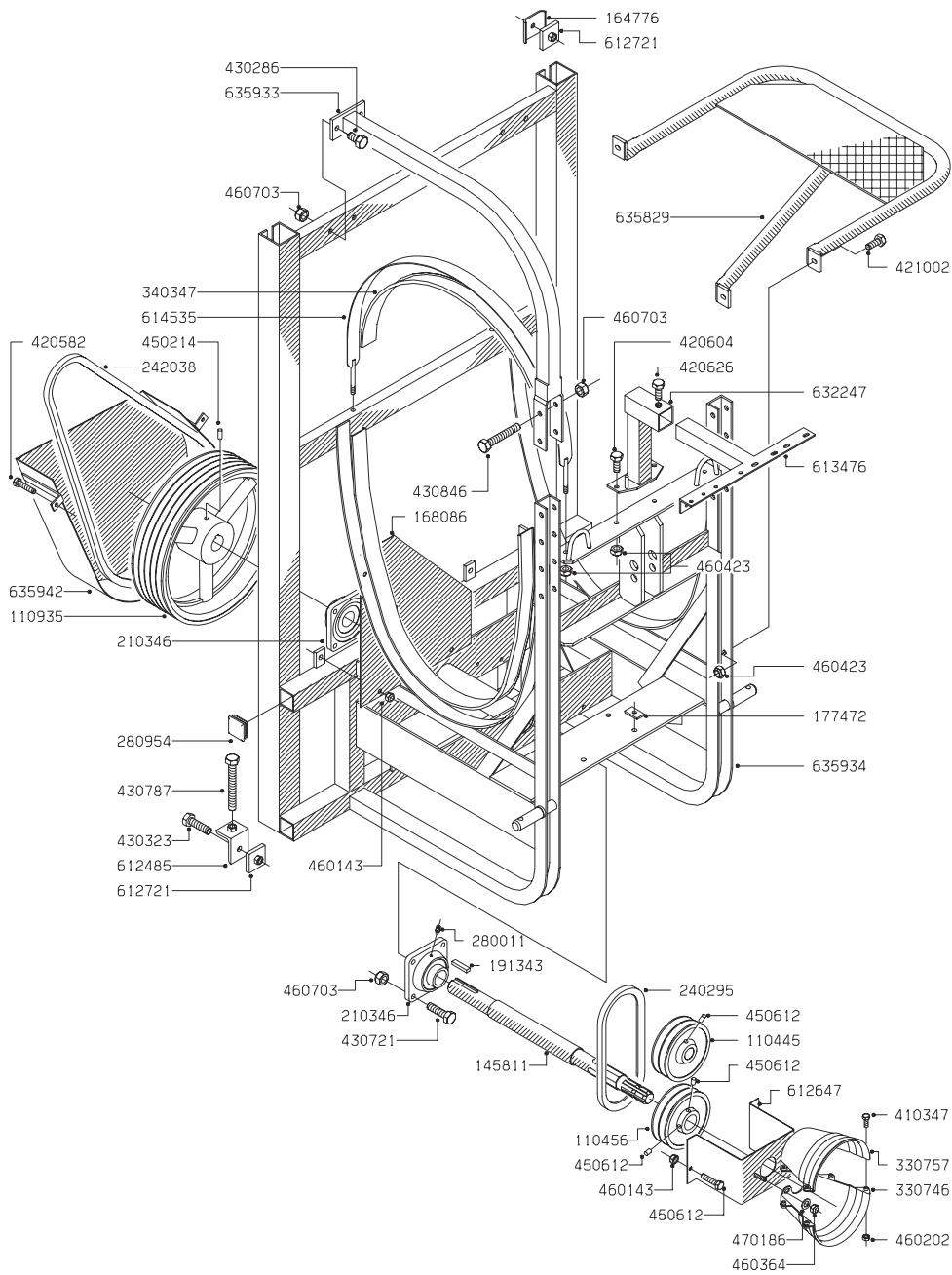
B300

Dampers HJ73



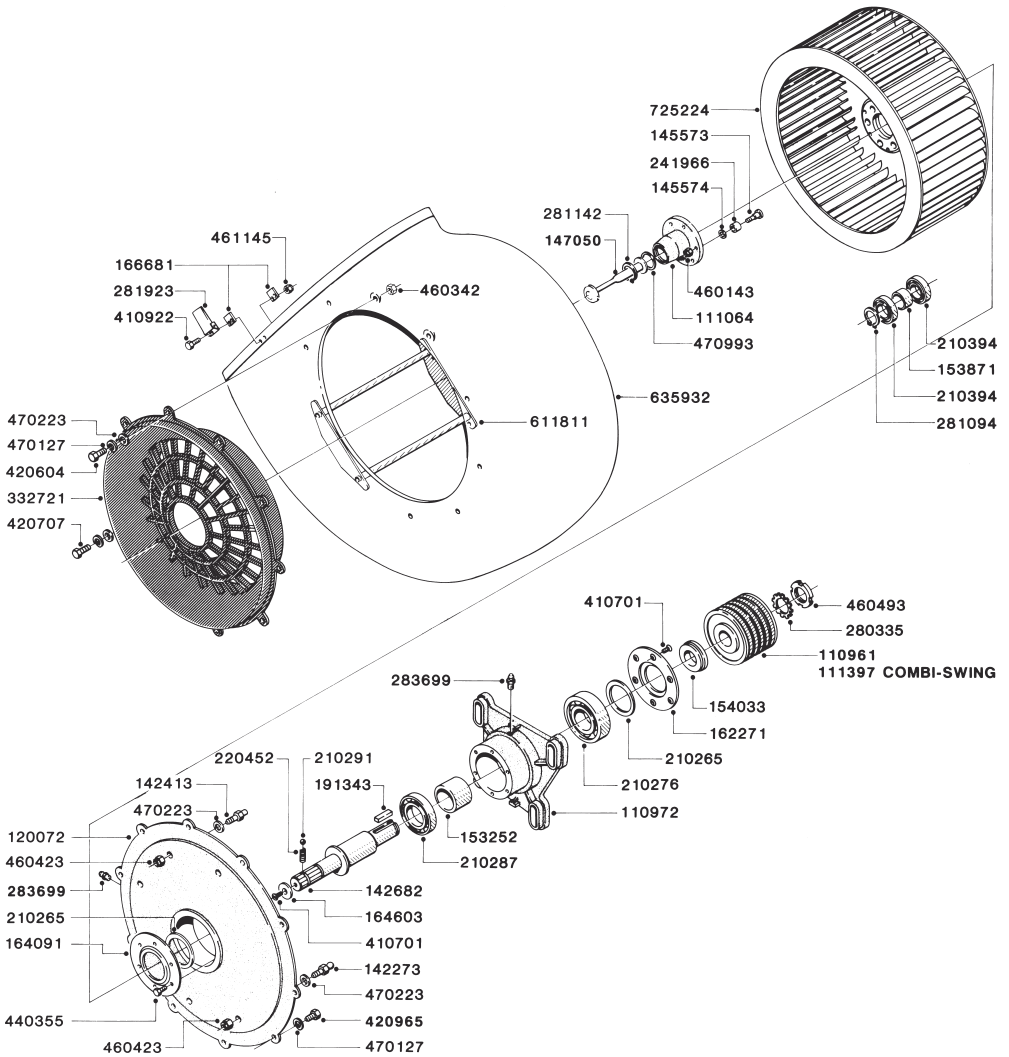
COMBI SWING

C401



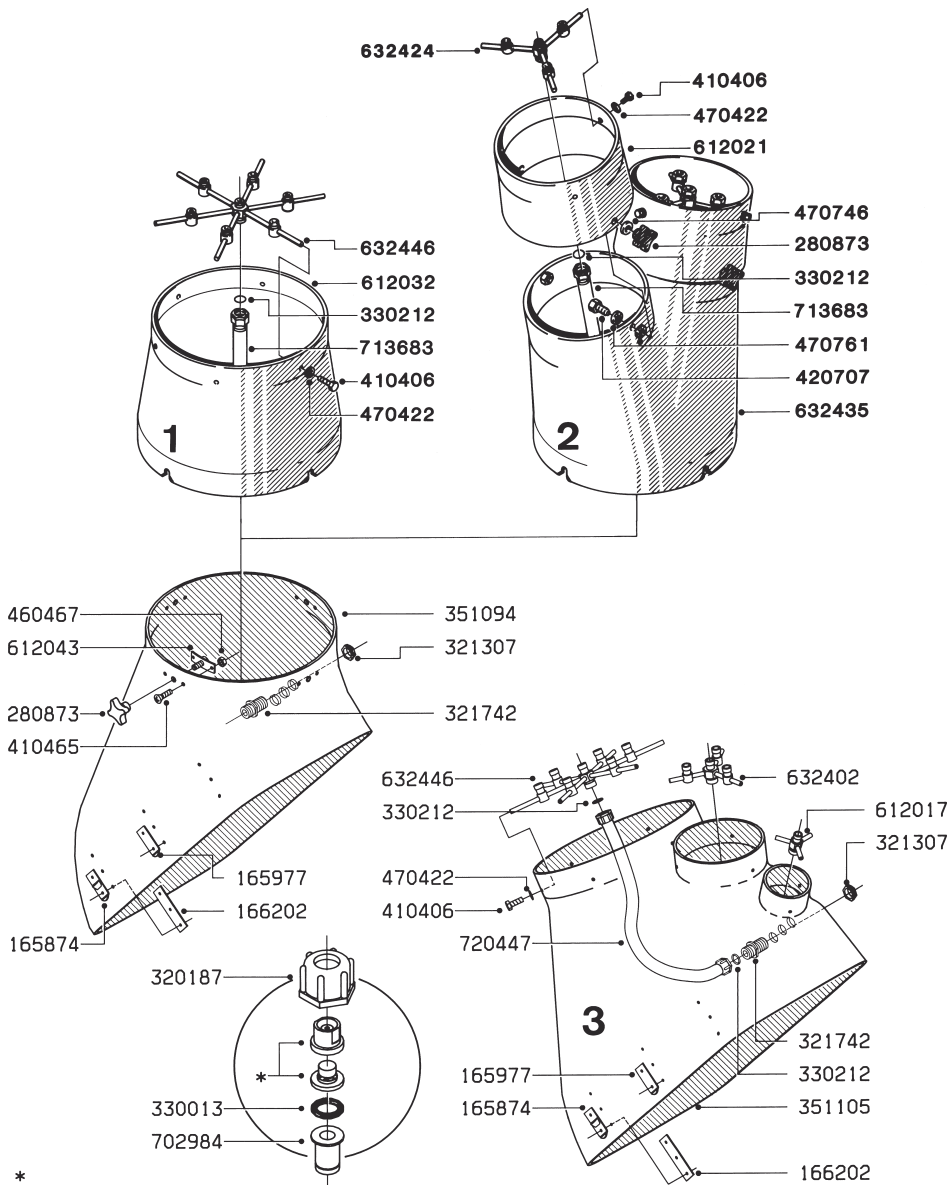
NK-COMBI SWING 600

F110



G5

COMBI/SUPER



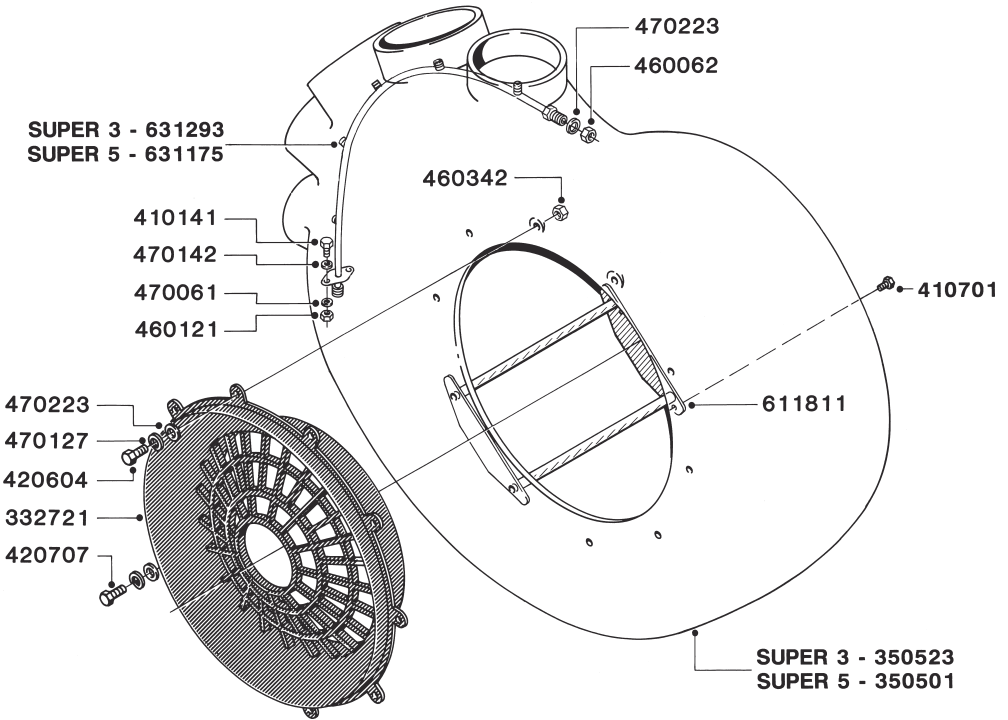
RØD, RED, ROUGE, ROT, ROJO - 371512

GRØN, GREEN, VERT, GRÜN, VERDE - 371513

BLÅ, BLUE, BLEU, BLAU, AZUL - 371514

COMBI

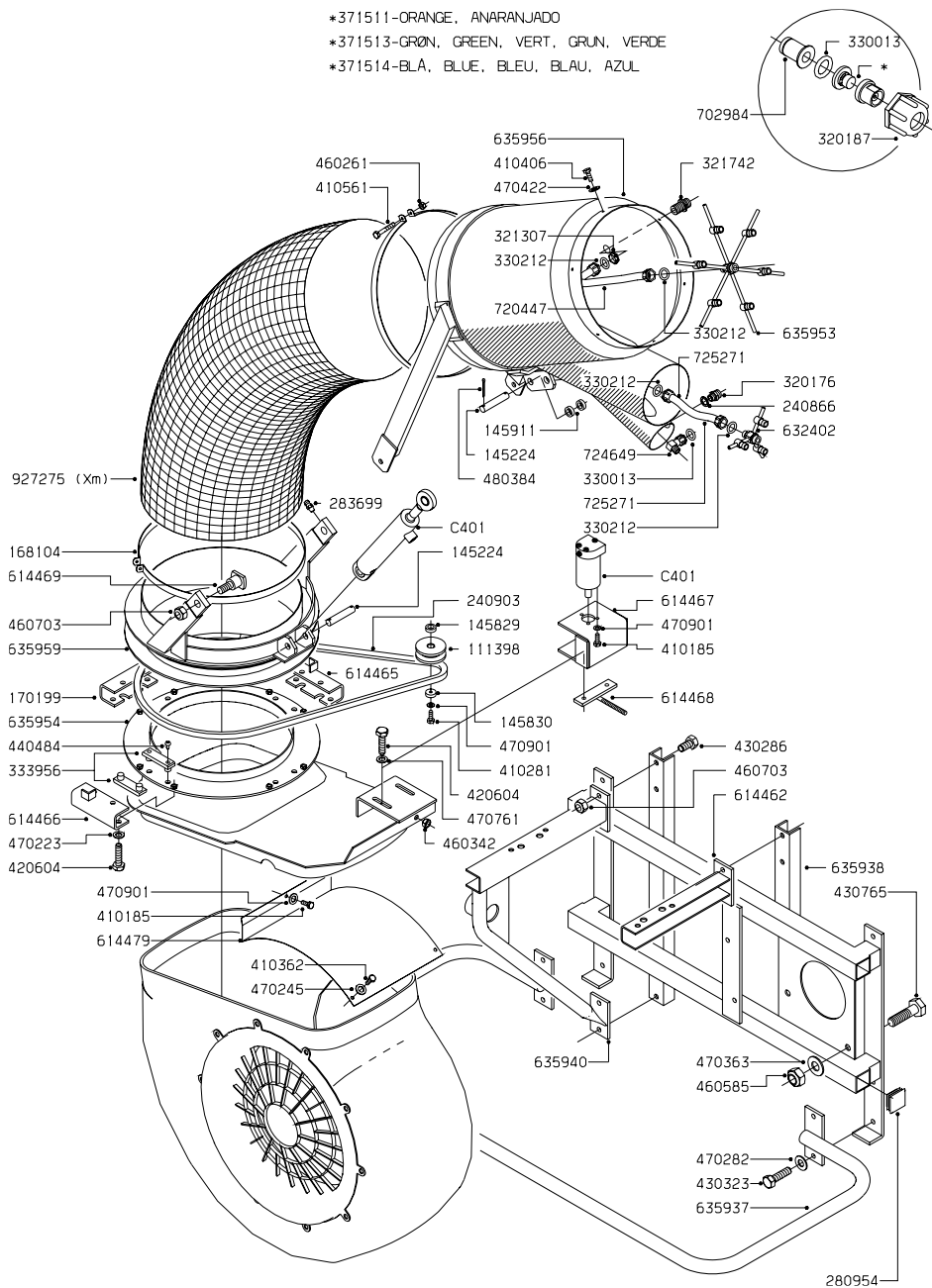
G109



G110

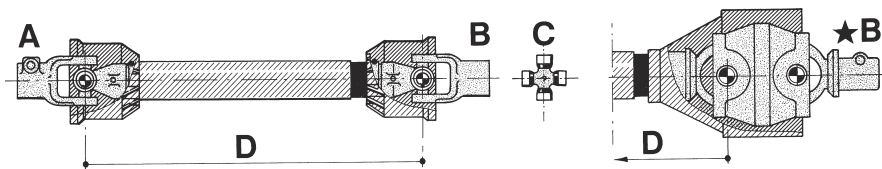
SUPER-3/5

- *371511-ORANGE, ANARANJADO
- *371513-GRÜN, GREEN, VERT, GRÜN, VERDE
- *371514-BLÄ, BLUE, BLEU, BLAU, AZUL



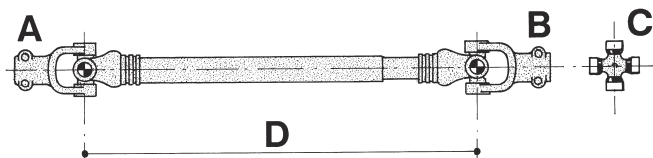
COMBI SWING

G11



	A ø	B ø	C	D min/max mm	Sprayer model
829416	1 ³ / ₈ "	1 ³ / ₈ "	284041	510/740	NK-MINI
829417	1 ³ / ₈ "	1 ³ / ₈ "	284042*	560/790	NK-MAXI/COMBI-SWING
829418	1 ³ / ₈ "	1 ³ / ₈ "	284042*	660/960	NK-COMBI/SUPER/LA
829445	1 ³ / ₈ "	1 ³ / ₈ "	289045	810/1220	LS/TS/TE-F820/LE-F820
829446	1 ³ / ₈ "	1 ³ / ₈ "	284041	810/1240	TE-F750/TE-MAXI-SPV/TP
829447	1 ³ / ₈ "	1 ³ / ₈ "	284041	660/990	LE/LP
829448	1 ³ / ₈ "	1 ³ / ₈ "	289043	610/910	LHP/THP
829443	1 ³ / ₈ "	1 ³ / ₈ "	284042	910/1380	TA
829424	1 ³ / ₈ "	1 ³ / ₈ "	-	810/1230	TR-MINI ★
829425	1 ³ / ₈ "	1 ³ / ₈ "	-	810/1210	TR-MAXI ★
829444	1 ³ / ₈ "	1 ³ / ₈ "	-	1210/1880	TA ★

* efter/after/apres/nach/después 1-9-91 289045



	A ø	B ø	C	Tank size l
829435	1 ³ / ₈ "	1 ³ / ₈ "	284159	600/800
829436	1 ³ / ₈ "	1 ³ / ₈ "	284159	1000
829437	1 ³ / ₈ "	1 ³ / ₈ "	284159	1500
829438	1 ³ / ₈ "	1 ³ / ₈ "	284159	2000
829440	1 ³ / ₈ "	1 ³ / ₈ "	284159	3000

K603

Heavy-dyty Shaft