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NK-VARIANT

Instruction book

674084-GB-98/3



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 1.3.98

Erik Holst
Managing Director
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.

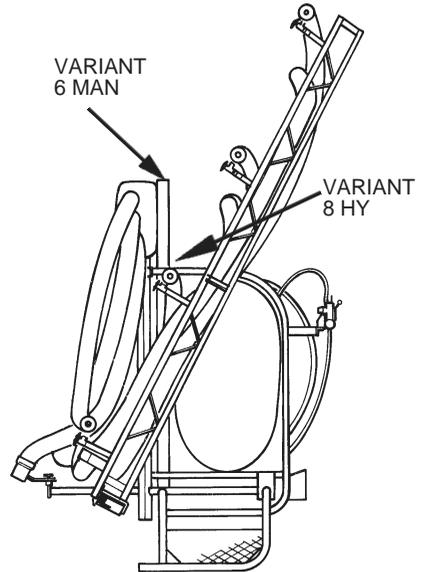


We congratulate you for choosing a HARDI plant protection product. The reliability and efficiency of this product depend on your care. The first step is to carefully **read and pay attention** to this instruction book. It contains essential information for the efficient use and long life of this quality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

As the instruction book covers both VARIANT 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.

Lifting points

When loading or unloading the sprayer from a truck or lorry with a crane, use the lifting points as shown.



Description

HARDI NK VARIANT mistblowers are for the application of crop protection chemicals in vegetable and berry crops. They consist of pump, 400 or 600 litre tank with frame, operation unit, transmission shaft, blower unit with air hoses and boom of 6 or 8 metre.

The design of the diaphragm pump is simple, with easily accessible diaphragms and valves that ensures liquid does not contact the vital parts of the pump.

The tank is made of highly impact-proof and chemical resistant polyethylene and has an appropriate design with no sharp edges for easy cleaning. A foot board is mounted on each side of the tank which if unfolded, serves as supports when dismantling the sprayer from the tractor.

The BK operating unit consists of; pressure agitator valve, safety valve, main ON/OFF valve, pressure filter with pressure gauge, distribution valves with pressure equalization and pressure control valve.



With the Self-Cleaning Filter (if fitted) the impurities that exist in the spray liquid will by-pass the filter and be recirculated back to the tank via the return flow.

The 6 metre boom (MAN) is manually folded. The 8 metre boom (HY) is fitted with 3 rams for folding/unfolding and lifting/lowering functions. The boom can be used vertically as well as horizontally for spraying. The vertical position is utilized for soft fruit and small trees.

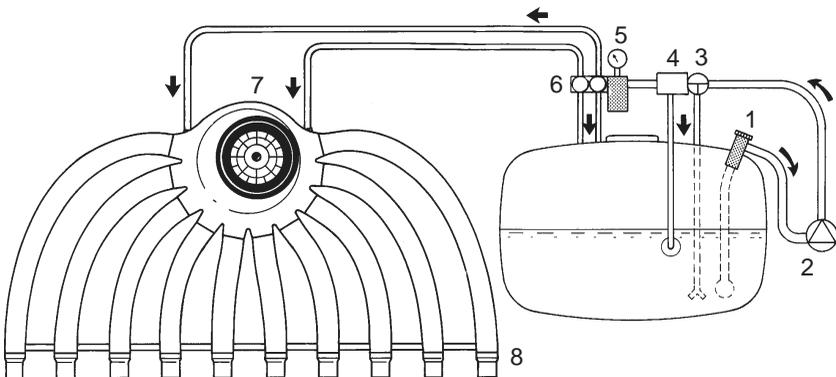
The centrifugal blower is divided into 10 equal spouts fitted with air hoses that lead to the boom. The hose end has an air spout with adjusting bracket mounted on the boom. A ceramic nozzle is placed in each spout which measures, atomizes, and distributes the spray liquid in the air stream.

Identification plates

An identification plate fitted on the frame and pump is to indicate model, serial number and country of origin. If ordering spare parts, inform your dealer of these so the right model and version are described.

Function diagram BK operating unit

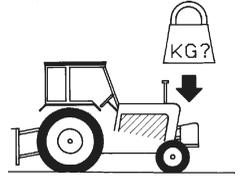
1. Suction filter
2. Pump
3. Pressure agitator valve
4. Operating unit
5. Pressure filter with pressure gauge
6. Distribution valves with pressure equalization
7. Blower with air hoses
8. Sprayer boom





Connecting the sprayer

WARNING: Note the weight of the sprayer.
General recommendations are as follows:



- Add ballast to front of tractor.
- Increase tyre pressure (see tractor instruction book).
- Be careful when filling/lifting the sprayer for the first time.
- Ensure the operating unit and tractor do not touch.
- Travel at slower speeds when driving with a full tank.
(The tractor braking effect will be reduced.)

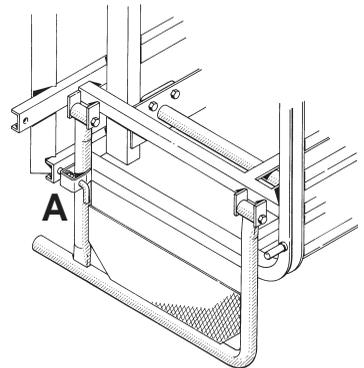
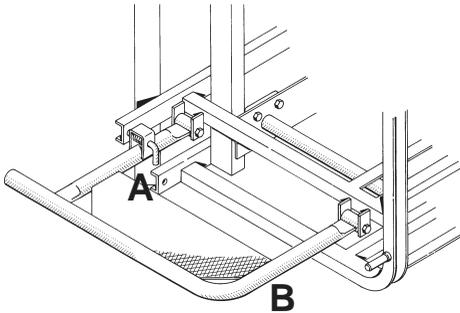
VARIANT 6 MAN

The sprayer is designed for three point suspension and is equipped with 22 mm pivots (cat. I) with bushes for 28 mm pivots (cat. II).

VARIANT 8 HY

The sprayer is designed for three point suspension and is equipped with 28 mm pivots (cat. II). The frame has retractable support legs that can be folded up to minimize crop damage. They must be folded down before lowering and disconnecting the sprayer. Proceed as follows:

1. Pull back on pawl **A**.
2. Swing support legs **B** down.
3. Check the pawl **A** is in the hole.



When the sprayer is mounted to the tractor the supports are folded up and will then function as foot boards.

Transmission shaft

Operator safety

To avoid accidents and personal injuries, note the following recommended precautions and safe operation practices.

Always **STOP ENGINE** before attaching the transmission shaft to tractor P.T.O. - most tractor P.T.O. shafts can be rotated by hand to facilitate spline alignment, when engine is stopped.

When attaching the shaft, make sure that the snap lock is **FULLY ENGAGED** - push and pull shaft until it locks.

WARNING: ROTATING TRANSMISSION SHAFTS WITHOUT PROTECTION GUARDS ARE FATAL

Always keep protection guards and chains intact and make sure that it covers all rotating parts, including cross journals at each end of the shaft. Do not use without protection guard.

Do not touch or stand on the transmission shaft when it is rotating - safety distance: 1.5 meter.

Prevent protection guards from rotating by attaching the chains allowing sufficient slack for turns.

Make sure that protection guards around tractor P.T.O. and implement shaft is intact.

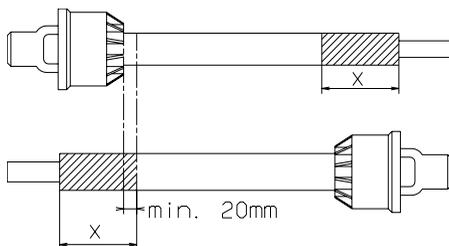
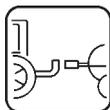
Always **STOP ENGINE** and remove the ignition key before carrying out maintenance or repairs to the transmission shaft or implement.

Installation of transmission shaft

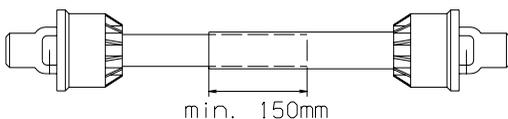
Initial installation of the shaft is done as follows:

1. Attach sprayer to tractor and set sprayer in the position with **shortest** distance between the tractor and sprayer pump P.T.O. shafts.
2. Stop engine and remove ignition key.
3. If transmission shaft must be shortened, the shaft is pulled apart. Fit the two shaft parts at tractor and sprayer pump and measure how much it is necessary to shorten the shaft. Mark the protection guards.

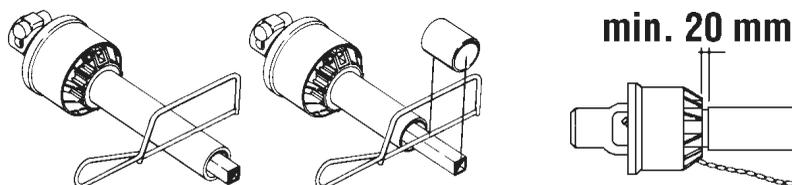




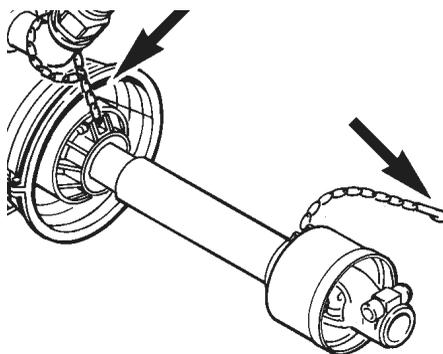
NOTE: The shaft must always have 1/3 as minimum overlap.



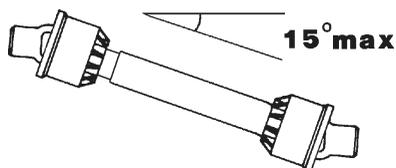
4. The two parts are shortened equally. Use a saw, and file the profiles afterwards to remove burrs.
5. Grease the profiles, and assemble male and female parts again.



6. Fit the shaft to tractor and sprayer pump.
NOTE: Female part towards tractor.
Fit the chains to prevent the protection guards to rotate with the shaft.



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



VARIANT 8 HY hydraulics

Connection requirements are;

- single outlet to raise or lower the boom,
- double outlet to fold or unfold the boom.

Ensure the snap couplers are clean before connection.

NOTE: The hydraulic system requires a minimum oil pressure of 130 bar and an oil capacity of approx. 3 litres. After having operated the boom and the system has been filled with oil, check tractor hydraulic oil level and top up if necessary.

Rear lights (if fitted)

Connect plug for rear lights to the tractors 7-poled socket and check that rear lights, stop lights and direction indicators work properly before driving anywhere. The wiring is in ISO accordance. See section on Technical specifications.

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.

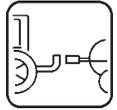
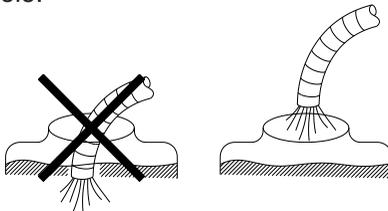
Operating instructions

Filling the main tank

Water is filled into the tank by removing the tank lid located at the top of sprayer tank. It is recommended to use as clean water as possible for spraying purposes. Always fill water through the strainer basket to prevent foreign particles from entering the tank. An overhead tank can be used in order to obtain high filling capacity.

WARNING: Do not let the filling hose enter the tank. Keep it outside the tank, pointing towards the filling hole.

If the hose is lead into the tank and the water pressure drops at the water supply plant, chemicals may be syphoned back and contaminate the water supply lines, plant and well.





Operating the boom

WARNING: Before unfolding the boom it is important to connect the tractor to prevent overbalancing of the sprayer.



VARIANT 6 MAN

The boom is unfolded as follows:

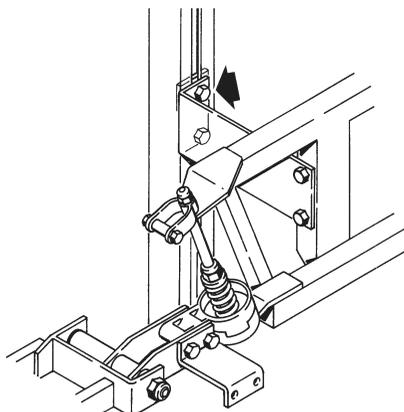
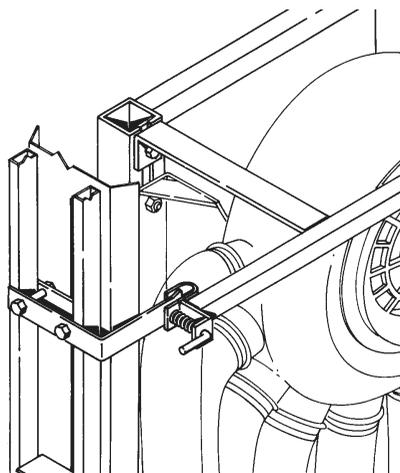
1. Hold the boom up and release it from transport bracket.
2. Carefully fold it down until the cable supports the boom. Be careful not to damage any of the air tubes.
3. Reverse the procedure to fold the boom.

Boom height

Correct boom height is very important in order to achieve the most optimal spray pattern. Small adjustments of the boom height can usually be made with the 3-point lift from the tractor - raising or lowering the sprayer.

In crops where greater adjustments are needed the boom height can be changed manually by loosening the bolts holding the boom to the frame.

NOTE: This is best done by 2 persons or with a mechanical hoist. The boom is then folded and the transport catch on the boom must also be adjusted to the transport bracket.

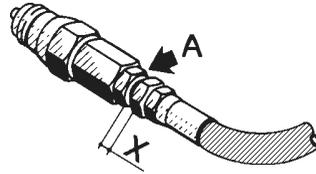


VARIANT 8 HY

WARNING: Testing of the hydraulic system should be done very cautiously. There may be air in the system and this may cause violent movements of the boom. Therefore take care that no persons or objects are hurt or damaged in the process of testing.

Speed regulation of the hydraulic movements

A valve for regulation of boom unfolding speed is located on the return hydraulic hose. It is important to adjust the valve so that the boom operates smoothly. Nut **A** is loosened, and the distance "x" is adjusted by turning the rapid coupling.



Unfolding and folding the boom

The boom is manoeuvred by the control levers of the tractor.

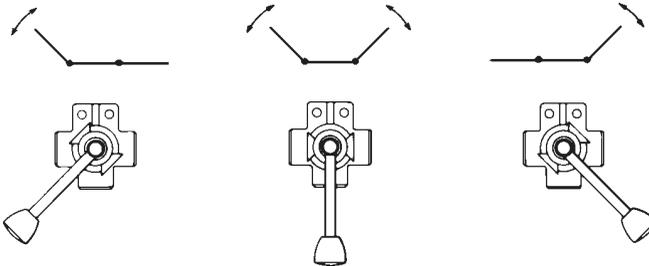
WARNING: Only do so when the tractor is not moving. Failure to do so will cause damage to the boom.

A hydraulic selector valve is placed at the front of the sprayer. It is used to preset the folding and unfolding of the boom and operation of the right or left side of the boom.



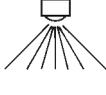
The boom is operated as follows:

1. Raise the boom up and free of the transport brackets.
2. Selector valve handle is set to centre position and the boom wings are unfolded.
3. Lower boom to recommended height.
4. Reverse the procedure to fold the boom.



Pulsation damper

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

	
bar	bar
1.5 - 3	0 - 1
3 - 15	1 - 3
15-25	3 - 4



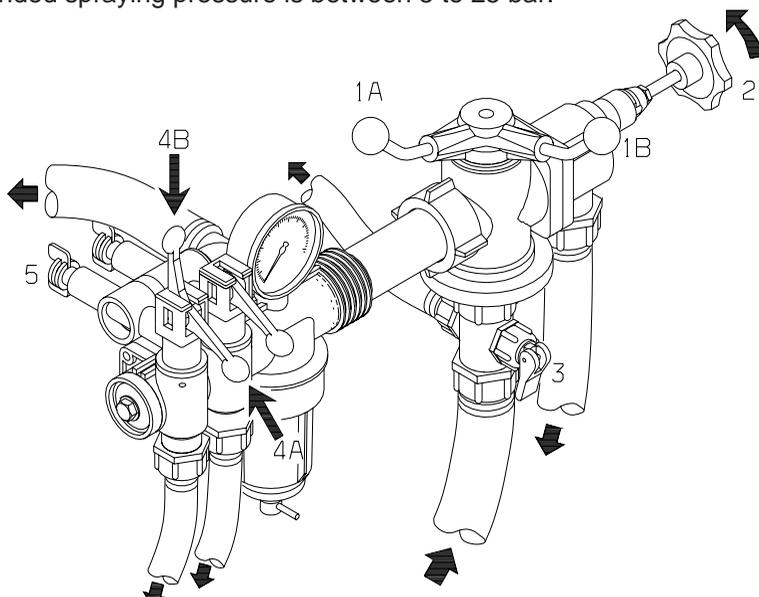
Adjustment of the BK controls

Initial adjustment and calibration is done with clean water. See also “Mistblowing Technique” book.

NOTE: To ensure long bearing life, the tractor P.T.O. must not exceed 540 r/min.

Pressure recommendations

When using the centrifugal blower, the recommended spraying pressure is between 3 to 20 bar. When using spray guns, the recommended spraying pressure is between 5 to 25 bar.



1. Choose the correct nozzle. Make sure that all nozzles are the same type and capacity. See “Mistblowing Technique” book.
2. Open or close lever **3** depending on whether pressure agitation is required. (Remember pressure agitation takes 5% to 10% of pump output).
3. Turn main ON/OFF handle to ON position **1A**.
4. Set levers on the distribution valve to ON position **4A**.
5. Turn the pressure control valve **2** anti-clockwise to its extreme position.
6. 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).

7. From a given forward speed in a gear and the nozzles chosen, the desired pressure on the pressure gauge is set by means of the pressure control valve **2**.

NOTE: Maximum pressure for model 321 pump is 25 bar. Do not operate over the maximum pressure.

Adjustment of pressure equalization

8. Note the pressure and place the first lever on the distribution valve to OFF position **4B**.

7. Turn the corresponding adjusting screw **5** until the pressure gauge again shows the same pressure.

9. Adjust the other section 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

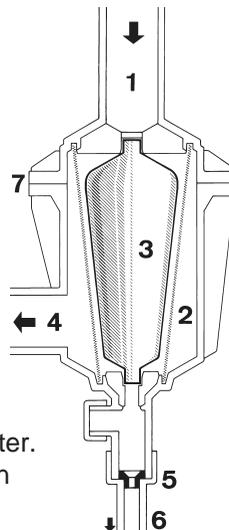
To stop the liquid flow to both sides of the blower, turn the handle to position **1B**. This returns the pump output to the tank through the return system. The anti-drip ball valve behind the nozzle ensures instantaneous closing of all nozzles.

To stop the liquid flow to one side only, turn lever of the distribution valve to OFF position **4B** for the section to be closed. The pressure equalization device ensures that the pressure does not rise in the section which remains open.

Self-Cleaning Filter (if fitted)

Function diagram

1. From pump
2. To safety valve
(operating pressure is 25 bar)
3. Filter screen
4. Guide cone
5. To operating unit
6. 3, 4, 5 or 6 mm restrictor
7. Return to tank
8. Nut



Choice of restrictor

It is important to have a large flow through the filter. This is achieved by choosing the restrictor size in relation to the liquid consumption of the sprayer.





4 restrictors are supplied. Use the green one (largest orifice **A**) first.

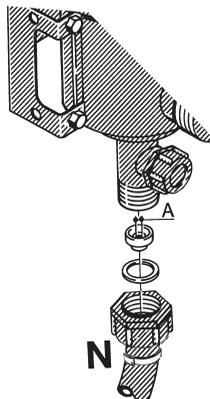
The hose **N** is unscrewed at the Self-Cleaning Filter, the restrictor is put in the hose and the hose is mounted again.

If the required working pressure cannot be obtained, the restrictor is too large. Choose a smaller restrictor.

Start with the black one, then the white and finally the red one.

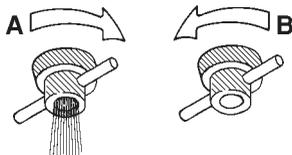
When cleaning the filter remove hose **N** and the hose at the safety valve, and check there are no residues.

Standard filter size is 80 mesh. Sizes of 50 and 100 mesh are available and can be changed by opening the filter top. Check the O-rings before reassembling the filter and replace if damaged.



Tank drain

To open: A
To close: B



Engaging and disengaging the fan

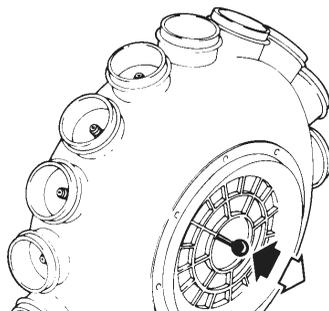
Calibration, spraying with guns or agitation under transport only needs the operation of the pump and it is therefore practical to disengage the fan.

VARIANT 6 MAN

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.

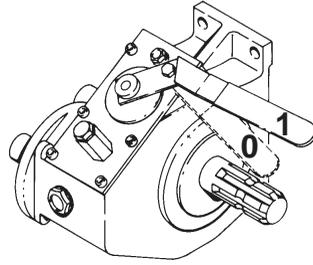


VARIANT 8 HY

The handle for engaging/disengaging the fan is below the pump.

Position 1 to engage fan.

Position 2 to disengage fan.



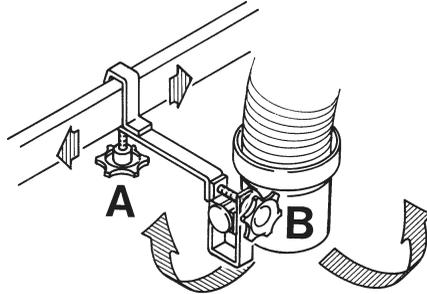
IMPORTANT: P.T.O. must be disengaged and both pump and fan must be stationary when engaging/disengaging the fan.

Adjustment of the spouts

The spouts are adjusted so that a uniform distribution of the spray mist is obtained in proportion to the leaf wealth.

VARIANT 6 MAN has bolts that are loosened first and the spouts can then be adjusted.

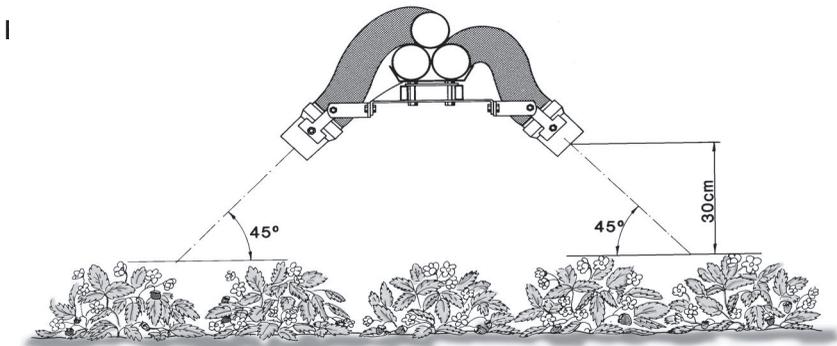
VARIANT 8 HY has hand screws **A** and **B** that are loosened so the spouts can then be adjusted.



Nozzles can be removed and the outlet blanked off with a $\frac{3}{8}$ " cap if not required.

Spout adjustment for horizontal boom

The placing of the spouts is done according to row distance and required air blast direction.





Row distance can vary from 0.5 - 1.5 m

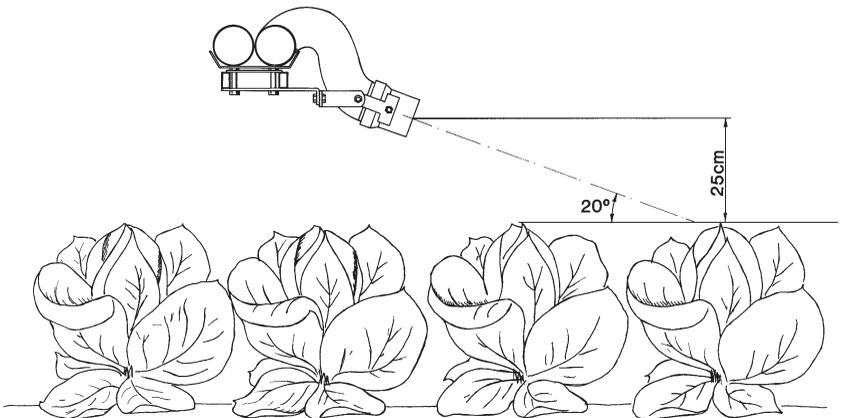
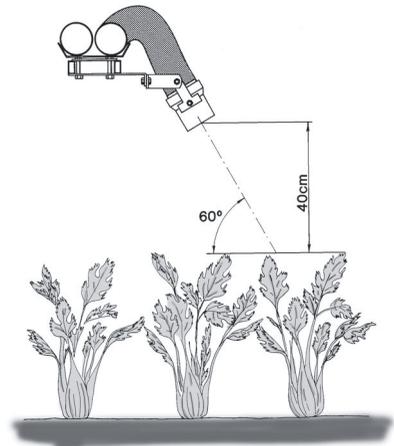
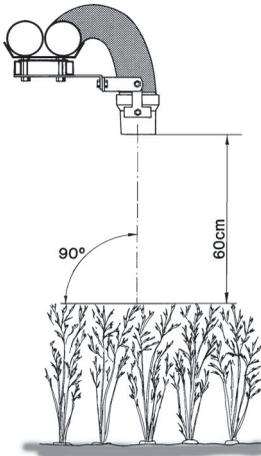
0.5 - 1.0 m 1 - 2 spouts/row

1.0 - 1.5 m 2 - 3 spouts/row

The number of spouts per row depends on the density of the plants.

For strawberry rows of 1.0 m the best covering of flowers, leaves and stems is reached, when two spouts are mounted just above the row. One of the spouts turned backwards - the other forward. The average angle will be 45° .

Example - Other crops:



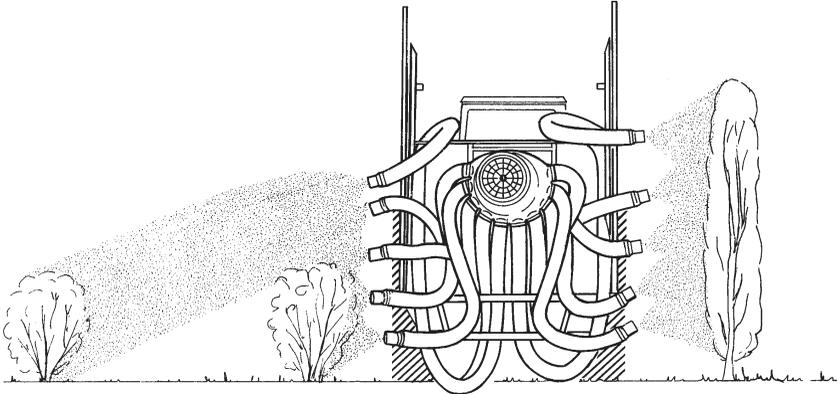
The spouts are adjusted so that the plants are covered with the spray liquid in the best possible way.

The best result is obtained when the spray mist stays in the plant growth.

Avoid reflection of the air and spray liquid from the ground. If spraying small plants, reduce the blower revolutions or place the air nozzles in a more horizontal position.

Spout adjustment for vertical boom

Secure the boom is in transport position. Small fruit trees and bushes can be sprayed. See "Mistblowing Technique" book.



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 "Mistblowing Technique" book and on the back of the Mistblower Calibrator disc.

Air volume and speed - see section on Technical specifications.

Optional Extras - see separate books.



Maintenance

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



Cleaning the sprayer

Guidelines

Read the whole label of the chemical. Take note of any particular instructions regarding recommended protective clothing, deactivating agents, etc. Read the detergent and deactivating agent labels. If cleaning procedures are given, follow them closely.

Be familiar with local legislation regarding disposal of pesticides washings, mandatory decontamination methods, etc. Contact the appropriate body, eg. Dept of Agriculture.

Pesticide washings can usually be sprayed out on a soakaway. This is an area of ground that is not used for cropping. You must avoid seepage or run-off of residues into streams, water courses, ditches, wells, springs, etc. The washings from the cleaning area must not enter sewers. Drainage must lead to a soakaway.

Cleaning starts with the calibration, as a well calibrated sprayer will ensure the minimal amount of remaining spray liquid. It is good practice to clean the sprayer immediately after use thereby rendering the sprayer safe and ready for the next pesticide application. This also prolongs the life of the components.

It is sometimes necessary to leave spray liquid in the tank for short periods, eg. overnight, or until the weather becomes suitable for spraying again. Unauthorized persons and animals must not have access to the sprayer under these circumstances.

If the product applied is corrosive, it is recommended to coat all metal parts of the sprayer before and after use with a suitable rust inhibitor.

Remember: Clean sprayers are safe sprayers.
Clean sprayers are ready for action.
Clean sprayers can not be damaged by pesticides and their solvents.

Cleaning

1. Dilute remaining spray liquid in the tank with at least 10 parts water and spray the liquid out in the orchard you have just sprayed.
NOTE: It is advisable to increase the forward speed (double if possible) and reduce the pressure.
2. Select and use the appropriate protective clothing. Select detergent suitable for cleaning and suitable deactivating agents if necessary.
3. Rinse and clean sprayer and tractor externally. Use detergent if necessary.
4. Remove suction filter and clean. Be careful not to damage the mesh. Reassemble the filter housing without the filter. Replace filter when the sprayer is completely clean.
5. With the pump running, rinse the inside of the tank. Remember the tank roof. Rinse and operate all components and any equipment that has been in contact with the chemical.
Before opening the distribution valves and spraying the liquid out, decide whether this should be done in the orchard again or on the soakaway.
If pressure filters are fitted with a drain valve, open valve and flush filter.
6. After spraying the liquid out, stop the pump and fill at least $\frac{1}{5}$ of the tank with clean water. Note that some chemicals require the tank to be completely filled. Add appropriate detergent and/or deactivating agent, eg. Washing soda or Triple ammonia.
NOTE: If a cleaning procedure is given on the chemical label, follow it closely.
7. Start the pump and operate all controls enabling the liquid to come in contact with all the components. Leave the distribution valves until last. Some detergents and deactivating agents work best if left in the tank for a short period. Check the label.
8. Drain the tank and let pump run dry. Rinse inside of tank, again letting the pump run dry. Remember that piston pumps must not run dry for more than a minute.
9. Stop the pump. If the pesticides used have a tendency to block nozzles and filters, remove and clean them now.
10. Replace all the filters and nozzles and store the sprayer. If, from previous experiences, it is noted that the solvents in the pesticide are particularly aggressive, store the sprayer with the tank lid open.
NOTE: If the sprayer is cleaned with a high pressure cleaner we recommend lubrication of the entire machine.





Filters

Clean filters ensure;

- Sprayer components such as pump valves and operating unit are not hindered or damaged during operation.
- 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 daily when spraying. Ensure the O-ring on filter housing is in good condition and lubricated.

BK Pressure filter / In Line Filters (if fitted)

The BK operating unit has an built in pressure filter. Unscrew the filter bowl to inspect and clean the filter.

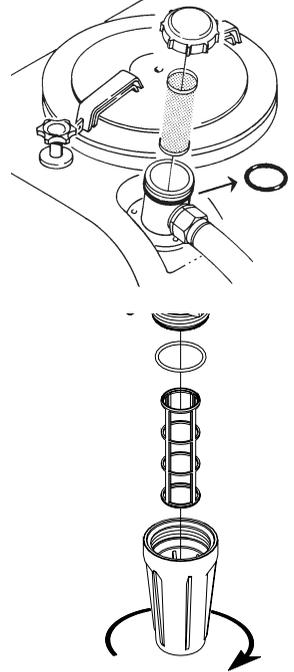
The sprayer may be equipped with In Line Filters. Unscrew the filter bowl to inspect and clean the filter.

Alternative filters are available. See section on Technical specifications - Filters and nozzles.

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 fertilizer has been used, we recommend lubrication of all sections.



POS.

Position on sprayer



Oil



Grease



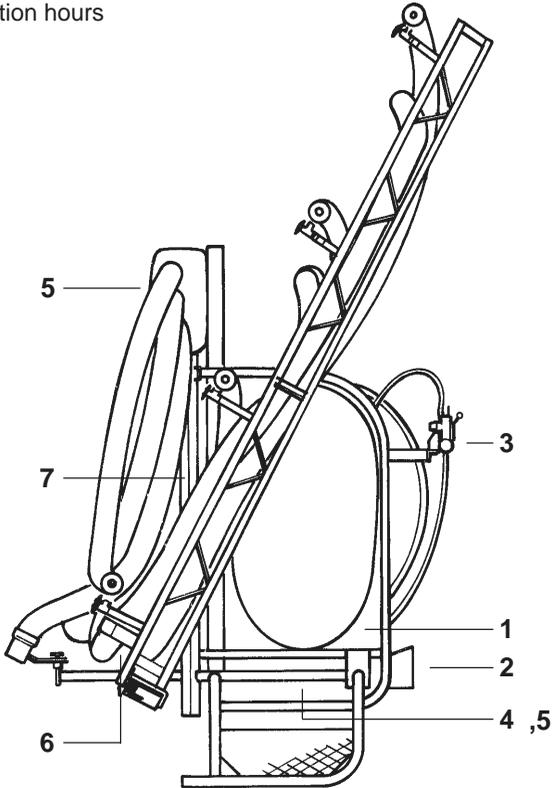
Operation hours

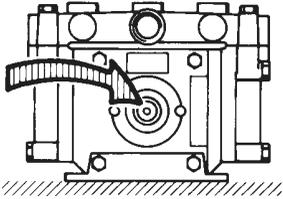
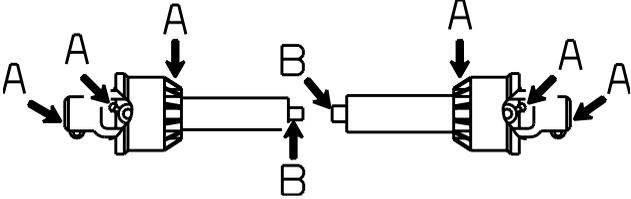
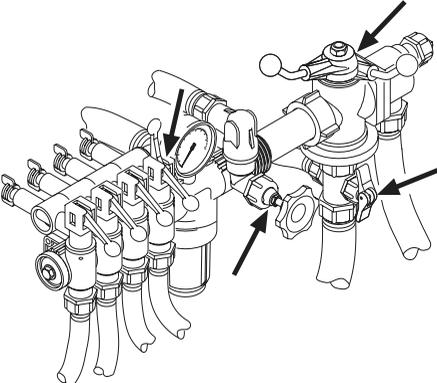
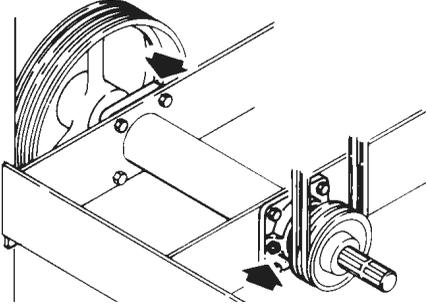


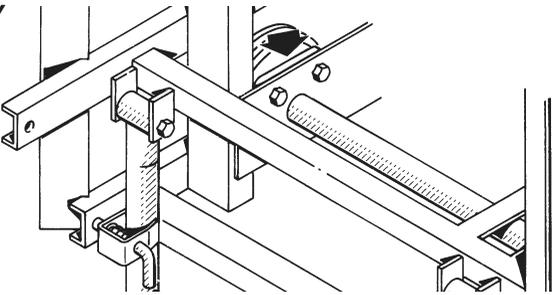
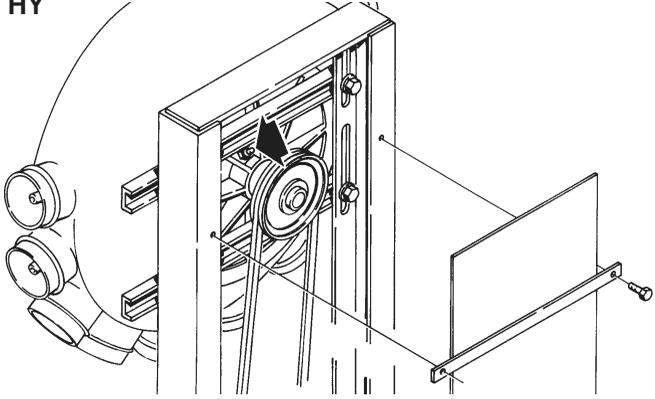
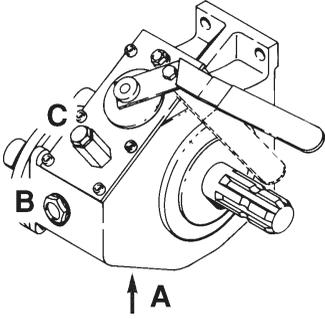
Page to find more information

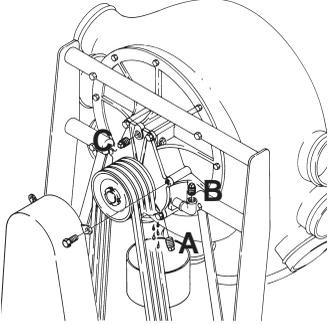
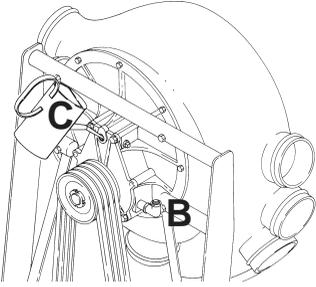
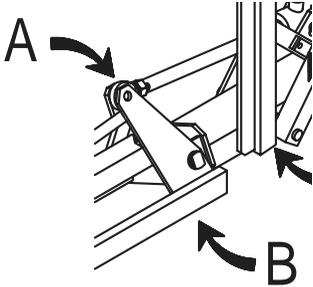
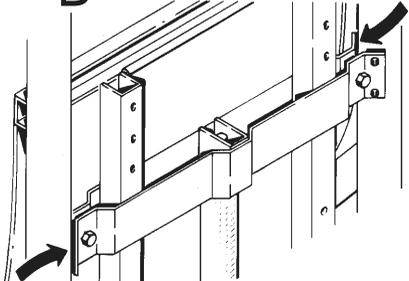


Winter protection or offseason storage



POS.					
1		X	40		27 34
2	A B	X X	8 40		7 8 29
3	X		20		12 28
4		x	40	<p data-bbox="331 1118 415 1150">6 MAN</p> 	

POS.					
4		x	40	<p>8 HY</p> 	
5		X	40	<p>8 HY</p> 	26 27
5	X		50/ 400	<p>8 HY</p> <p>Gear oil type: SAE 90 EP. Quantity approx: 0.3 litre</p> <p>The gear box is filled with oil from the factory. Check oil level daily. The oil must come to the level indicator glass.</p>  <p>A = Drain plug B = Level indicator C = Filling hole</p>	

POS.					
5	X		50/ 400	<p>6 MAN</p> <div data-bbox="333 268 631 453" style="border: 1px solid black; padding: 5px;"> <p>Gear oil type: SAE 90 EP. Quantity approx: 0.3 litre</p> <p>Initial oil change is done after the 50th hour of work and after that every 400 hours.</p> </div> 	26
5	X		50/ 400	 <p>6 MAN</p> <p>A = Drain plug B = Level indicator C = Filling hole</p>	26
6 A B	X	X	40 40		25 26
7		X	40		25

Re-adjustment of the boom

After having used the sprayer for some days the boom should be adjusted according to the following instructions:

NOTE: Tractor and sprayer must be on level ground with unfolded boom. Sprayer must be lubricated. See section on Lubrication.

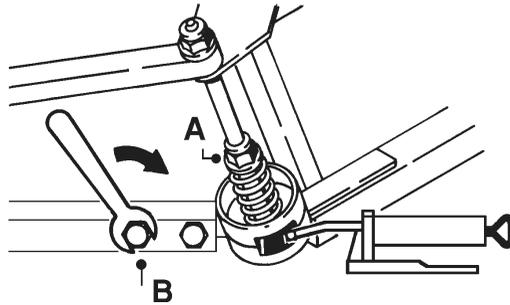
WARNING: NOBODY MUST BE UNDER THE BOOM WHILST ADJUSTMENT IS CARRIED OUT.

VARIANT 6 MAN

BOOM BREAKAWAY

The function of the breakaway is to prevent or reduce boom damage if it should strike an object or the ground. If it is too tight, it will not function. If it is too loose, it will yaw (forward and back movement).

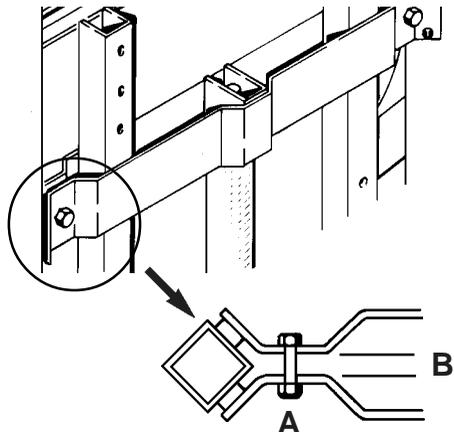
Slacken screw nut **A** to decrease breakaway resistance. Do not tighten excessively; better to loose than too tight. Again minor adjustments in the field may be necessary. Ensure also channel bolts **B** are tight.



VARIANT 8 HY

1. BOOM LIFT

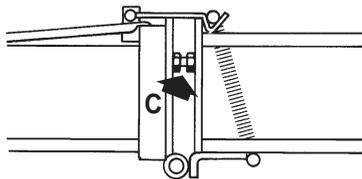
The boom lift must be adjusted so it is firm and yet can freely move up and down when the lift ram is operated. Adjust both sides. Adjust **A** so gap **B** is equal at all 4 points.





2. BREAKAWAY

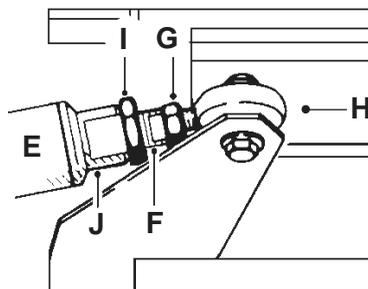
Loosen counter nut **C** and turn screw **D** until the outer section of the boom is parallel with the inner section of the same side.



3. PARALLEL ADJUSTMENT OF INNER SECTION

1. Check that the hydraulic rams **E** are fully extended. Make sure the extension **F** is screwed in and tight.

2. Loosen counter nut **G** and adjust the ram eye **H** so that the boom wings are parallel with the centre section.



4. ADJUSTMENT FOR TRANSPORT BRACKETS

Fold boom and lower cautiously into transport brackets. Loosen counter nut **I** and adjust **K** so the boom rests in the middle of the brackets.

IMPORTANT: Check all counter nuts are tight after adjustment.

Adjustment of V-belts

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 hours as they need to be run in. Tighten if necessary. Thereafter check every 40 hours.

A 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.

Pump drive

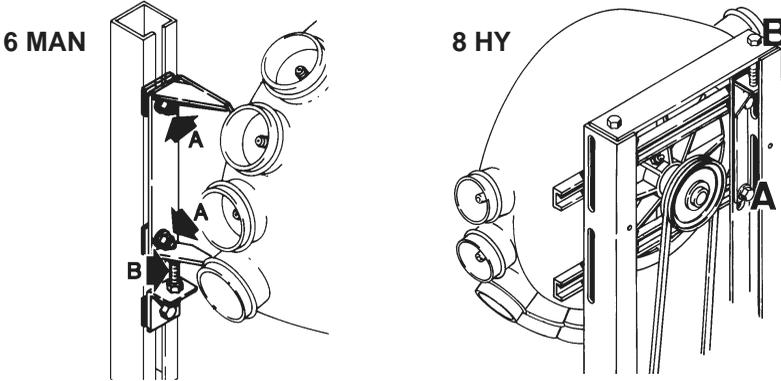
1. Remove cover.
2. Loosen nuts at the pump feet.
3. Adjust belt tension by turning bolts. The pump crankshaft must remain parallel to the blower drive shaft.



Blower drive

1. Remove cover.
2. Loosen nuts **A** on the blower suspension.
3. Adjust belt tension by turning bolts **B**.

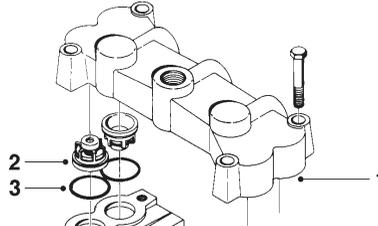
NOTE: Tighten counter nuts and replace covers.



Changing of valves and diaphragms

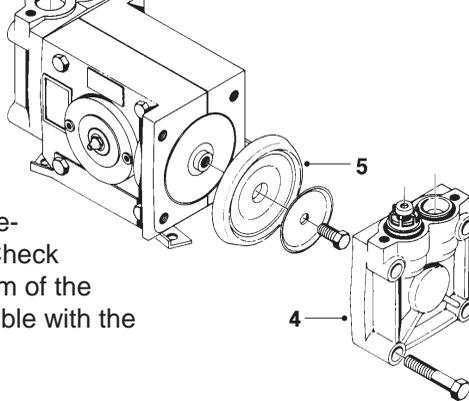
Valves

Remove valve cover **1**. Before changing the valves **2** note their orientation so they are replaced correctly. It is recommended to use new gaskets **3** when changing or checking the valves.



Diaphragms

Remove the diaphragm cover **4**. The diaphragm **5** may then be changed. If fluids have reached the crankcase, re-grease the pump thoroughly. Check also the drain hole at the bottom of the pump is not blocked. Reassemble with the following torque setting.





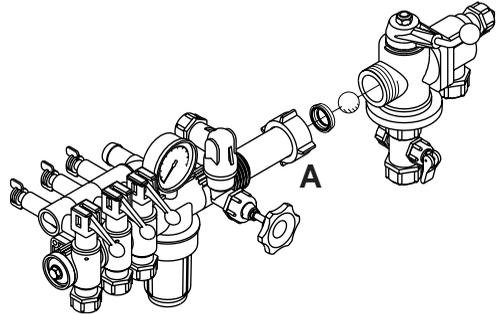
Pump Model	Valve cover Nm	Diaphragm cover Nm	Diaphragm bolt Nm
321	50	80	60

1 Nm = 0.74 ft-lb

Changing the ball seat in operating unit

If the main ON/OFF valve does not seal properly (dripping nozzles when main ON/OFF valve is closed), the ball and seat should be checked.

Remove the 2 bolts fixing the main ON/OFF-pressure valve unit to the bracket, unscrew the union nut **A** and pull the valve away from the distribution valves.



Check the ball for sharp edges and scratches, and check the ball seat for cracks and wear - replace if necessary.

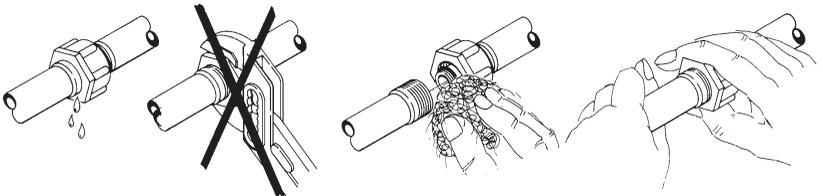
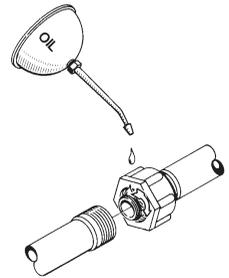


Fittings

Poor seals are usually caused by;

- 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** overtighten. Disassemble, check condition and position of O-ring or gasket, clean lubricate and reassemble. 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 stored.

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. See section on Cleaning the sprayer.

Transmission shaft

It is important that the push pins are clean and well lubricated, to ensure safe function.

Every 40 hours:

Inspection of protection guards, function and condition. Replace possible damaged parts.

Every 1000 hours:

Check condition of protection guards and replace nylon bearings. Check general condition of cross journals and push-pin/quick release - replace if necessary.

Anti-freeze precaution

If the sprayer is not stored in a frost free 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 spray hose are filled. The anti-freeze solution also hinders the O-rings and gaskets from drying out.

Remove the glycerine filled pressure gauge and store it frost free in vertical position.





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.
- Electrical and hydraulic components that are contaminated will result in poor connections and rapid wear to the hydraulic system.

Therefore ALWAYS check:

1. Suction and pressure filter is 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. Electrical and hydraulic components are maintained clean.

Fault	Probable cause	Control / remedy	
Liquid system			
No spray from boom when turned on.	Air leak on suction.	Check if suction filter O-ring is 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. Restrictor nozzle in Self-Cleaning Filter not fitted. Safety valve spring for Self-Cleaning Filter not tight. 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.	

Fault	Probable cause	Control / remedy
Pressure increasing	Pressure filters beginning to clog.	Clean all filters.
	Agitation nozzles clogged.	Check by turning agitation off and on.
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. Reduce pump r/min.
		Check safety valve for Self-Cleaning Filter is tight.
		Ensure returns inside tank are present. Use foam damping additive.
Liquid leaks from bottom of pump.	Damaged diaphragm.	Replace. See Changing of valves and diaphragms.
Operating unit BK/EC and EC		
Operating unit not functioning	Blown fuse(s).	Check mechanical function of microswitches. Use cleaning/lubricating agent if the switch does not operate freely. Check motor. 450-500 milli-Amperes max. Change motor, if over.
	Wrong polarity.	Brown - pos. (+). Blue - neg. (-).
	Valves not closing properly.	Check valve seals for obstructions. Check microswitch plate position. Loosen screws holding plate a 1/2 turn.
	No power.	Wrong polarity. Check that brown is pos. (+), Blue is neg. (-). Check print plate for dry solders or loose connections. Check fuse holder are tight around fuse.

Fault	Probable cause	Control / remedy
Hydraulic system		
Boom slow/ericid.	Air in system.	Loosen ram connection and activate hydraulics until oil flow has no air in it (not whitish).
	Regulation valve incorrectly set	Open or close until desired speed is achieved (clockwise = less speed). Remember oil must be at operating temperature.
	Insufficient hydraulic pressure.	Check output pressure of tractor hydraulics. Minimum for sprayer is 130 bar.
	Insufficient amount of oil in tractor reservoir.	Check and top up if needed.
Ram not functioning.	Restrictor or regulation valve blocked.	Secure boom Dismantle and clean.

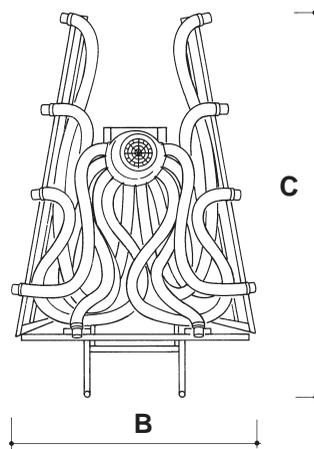
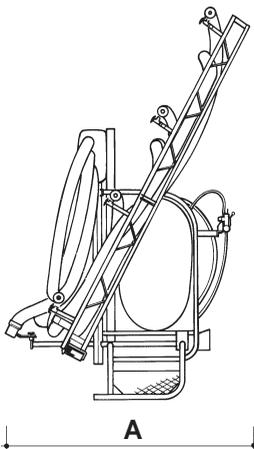


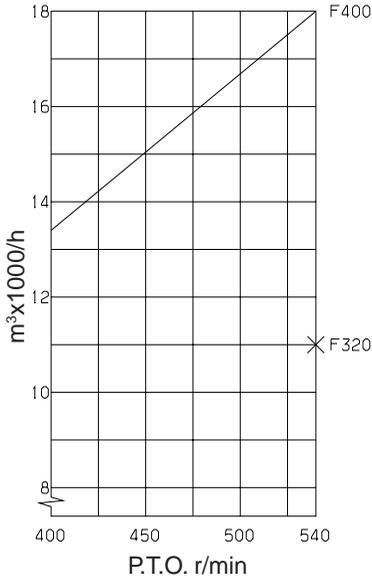
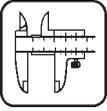
Technical specifications

Measure and weight

Model	Pump model	Pressure max. bar	Pump capacity l/min	Tank size l	Blower dia. mm	Air volume m ³ /h	Air speed average m/s	*Power consumption kW	Measure A x B x C cm	Weight kg
NK-432-VARIANT	321	25	51	400	320	11.000	47	13	135 x 160 x 225	342
NK-632-VARIANT	321	25	51	600	320	11.000	47	13	200 x 230 x 240	500

*stated at 540 P.T.O. r/min, pump pressure at 0 bar



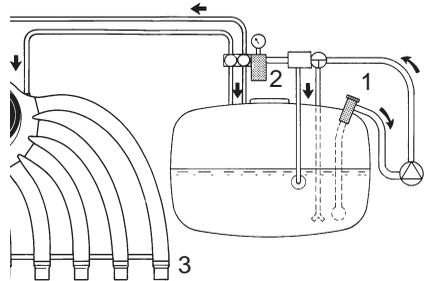


Pump power consumption and capacity

321/7.0	r/min									
	300		400		500		540			
bar	l/min	kW	l/min	kW	l/min	kW	l/min	kW	l/min	kW
0	24	0.22	33	0.29	44	0.37	51	0.45		
5	22	0.37	30	0.52	37	0.67	40	0.75		
10	21	0.60	29	0.82	36	1.04	39	1.12		
15	21	0.75	29	1.04	36	1.23	38	1.41		
20	20	0.89	28	1.23	35	1.57	37	1.72		
25	20	1.12	27	1.49	35	1.86	37	2.01		
Rotation per min	r/min	Capacity			l/min	Suction height			0,0 m	
Power consumption	kW	Max. pressure			15 bar	Weight			24,2 kg	

Filters and nozzles

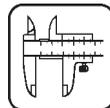
Pos.	Mesh/ colour	Description/ nozzle
1	30 green	Suction filter
2	50 blue	Pressure filter
4	50 blue	Nozzle 1299-12



Temperature and pressure ranges

Operating temperature range: 2° to 40° C.

Operating pressure for safety valve: 25 bar



Electrical connections

Rear lights

Position	Wire colour
1. LHS direction indicator	Yellow
2. Free	Blue
3. Frame	White
4. RHS direction indicator	Green
5. RHS rear position lamp	Brown
6. Stop lamps	Red
7. LHS rear position lamp	Black

Materials and recycling

Tank	HDPE
Hoses	PVC
Valves	mainly glass-filled PA.
Fittings	PA

Disposal of the sprayer

When the equipment has completed its working life, it must be thoroughly cleaned. The tank, hose and synthetic fittings can be incinerated at an authorized disposal plant. The metallic parts can be scrapped. Always follow local legislation regarding disposal.

Pictorial symbols



Description



Service/adjustment



Winter storage



Function



Liquid flow



Operational problems



Connection



Pressure



Technical specifications



Warning



Cleaning



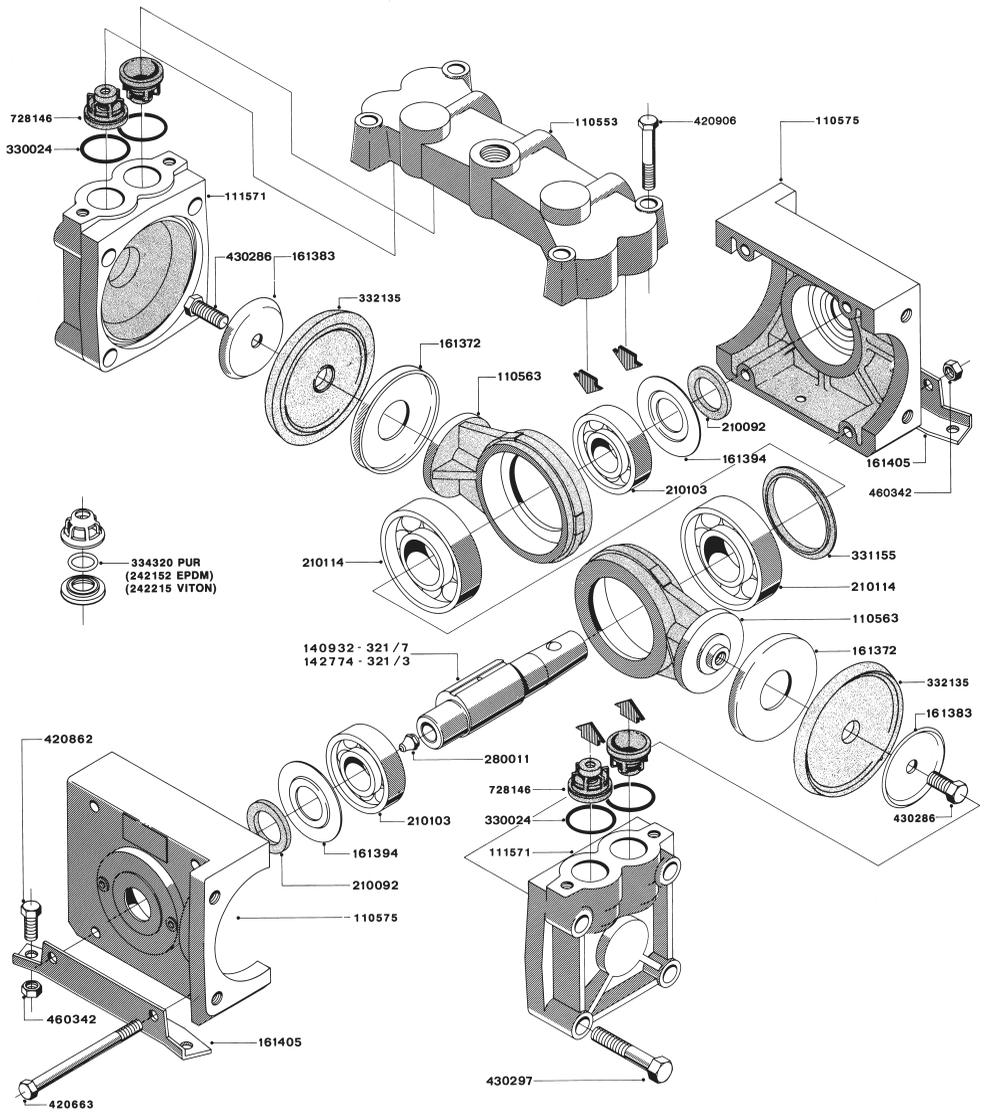
EU Declaration of Conformity



Operating

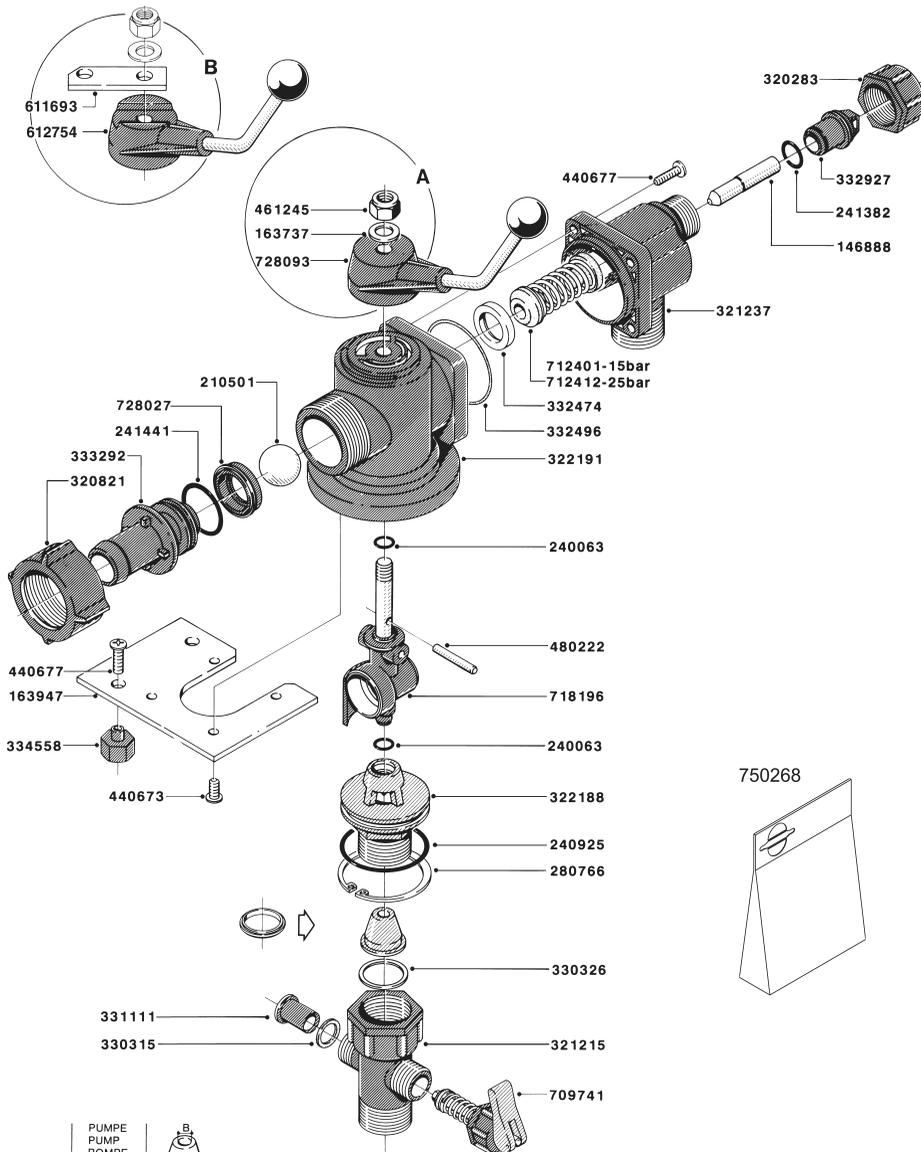


Lubrication



A17

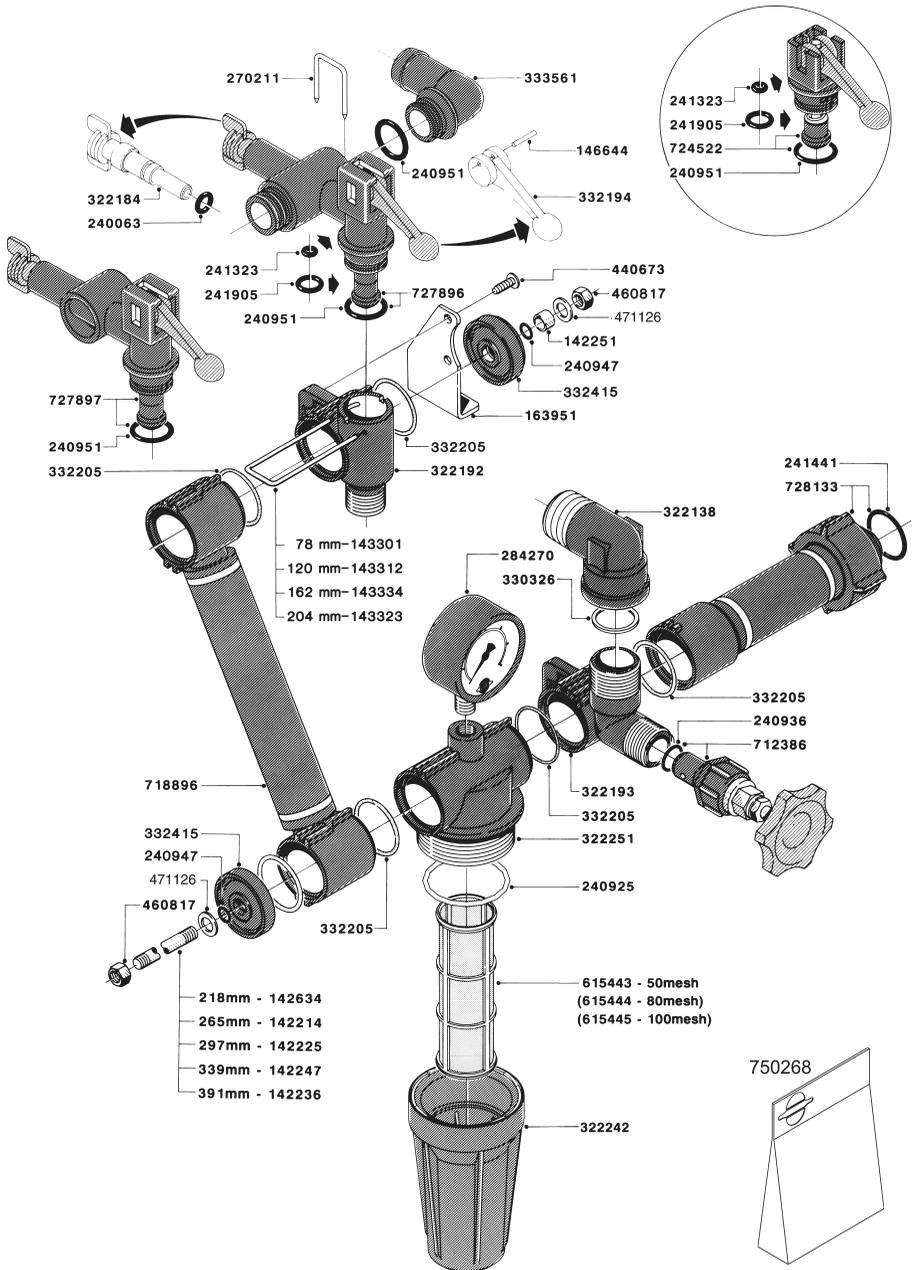
321



PUMPE PUMP POMPE PUMPE BOMBA		B mm	FARVE	COLOUR	COULEUR	FARBE	COLOR	
600	333314	5,2	BLÅ	BLUE	BLEU	BLAU	AZUL	
1202	333325	7,3	RØD	RED	ROUGE	ROJO	ROJO	
1302	333336	19,0	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

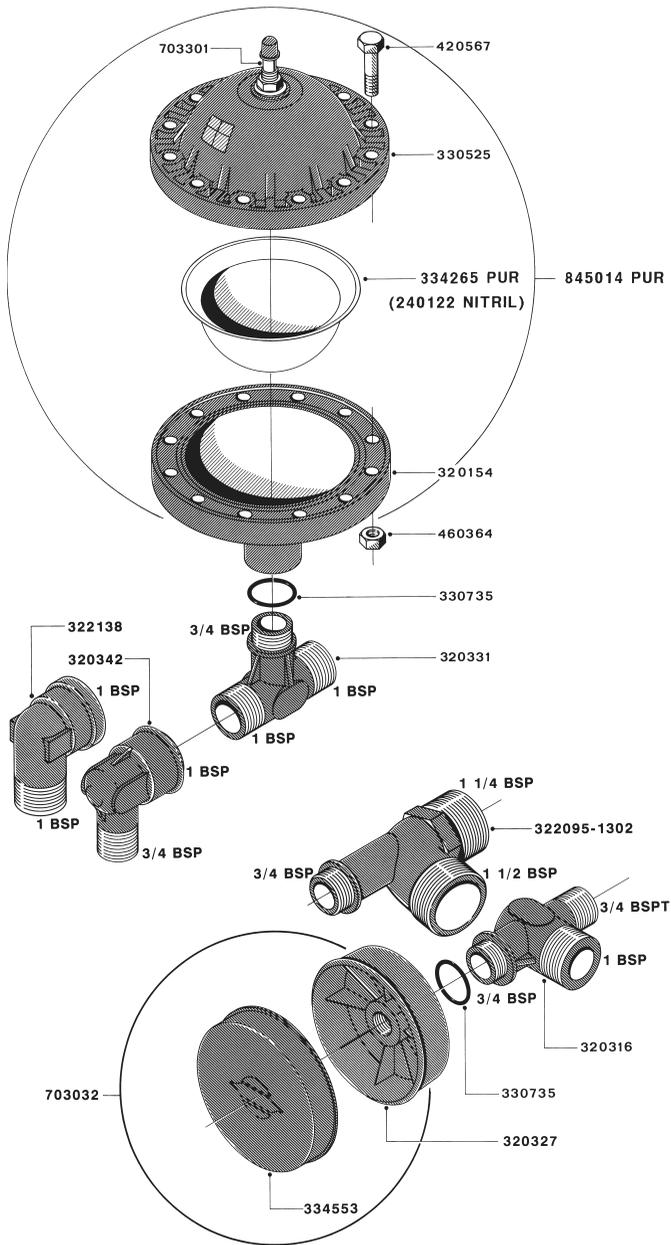
Unit BK 180K (92)

B9



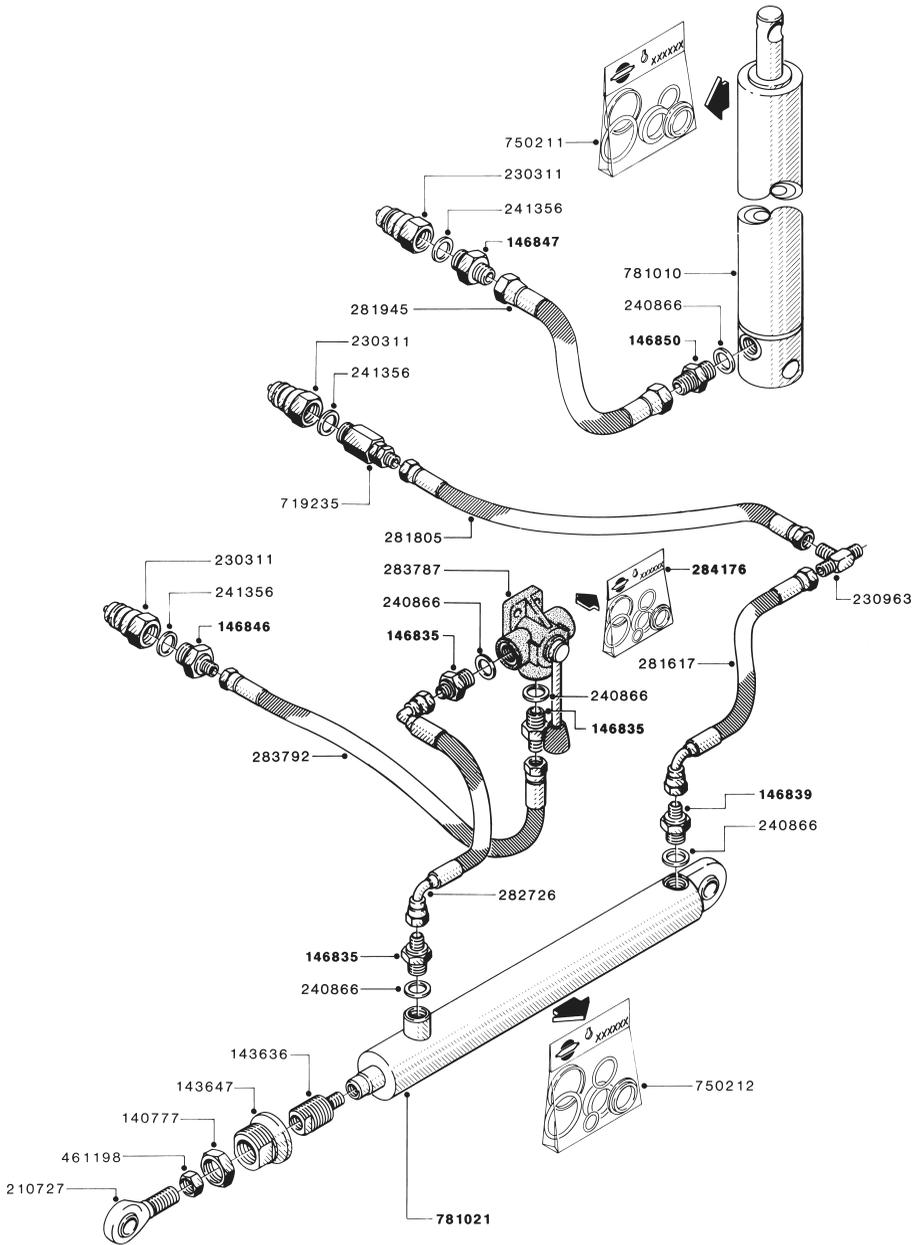
B13

Distributor BK 180K (94)



Dampers HJ73

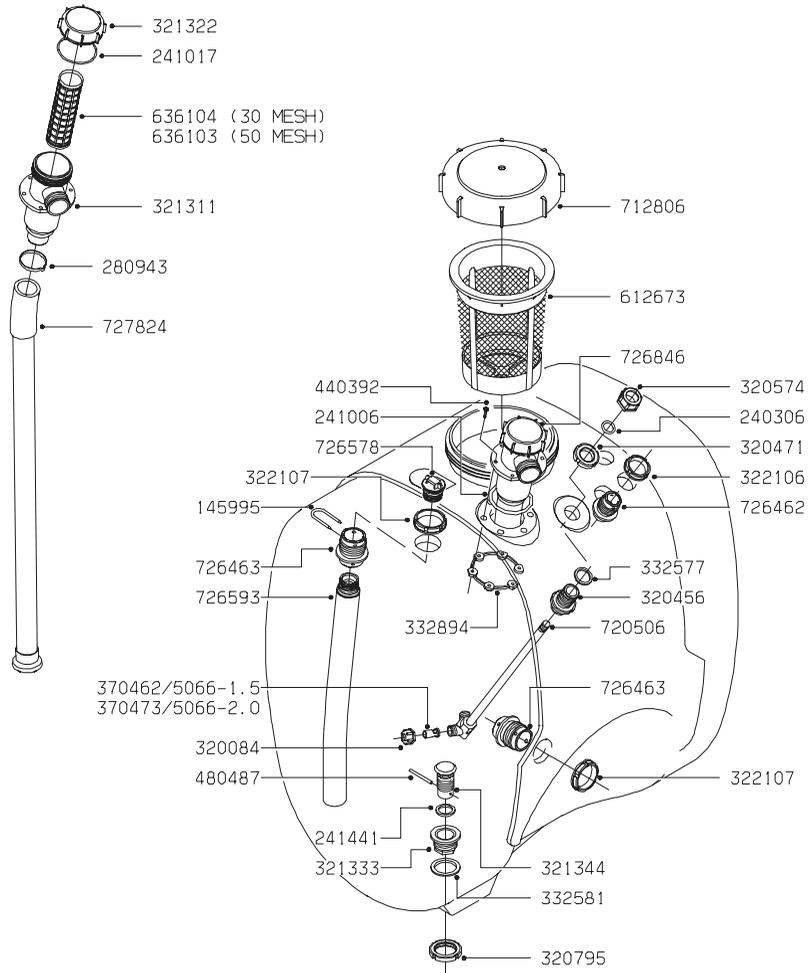
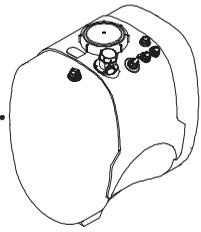
B300



C400

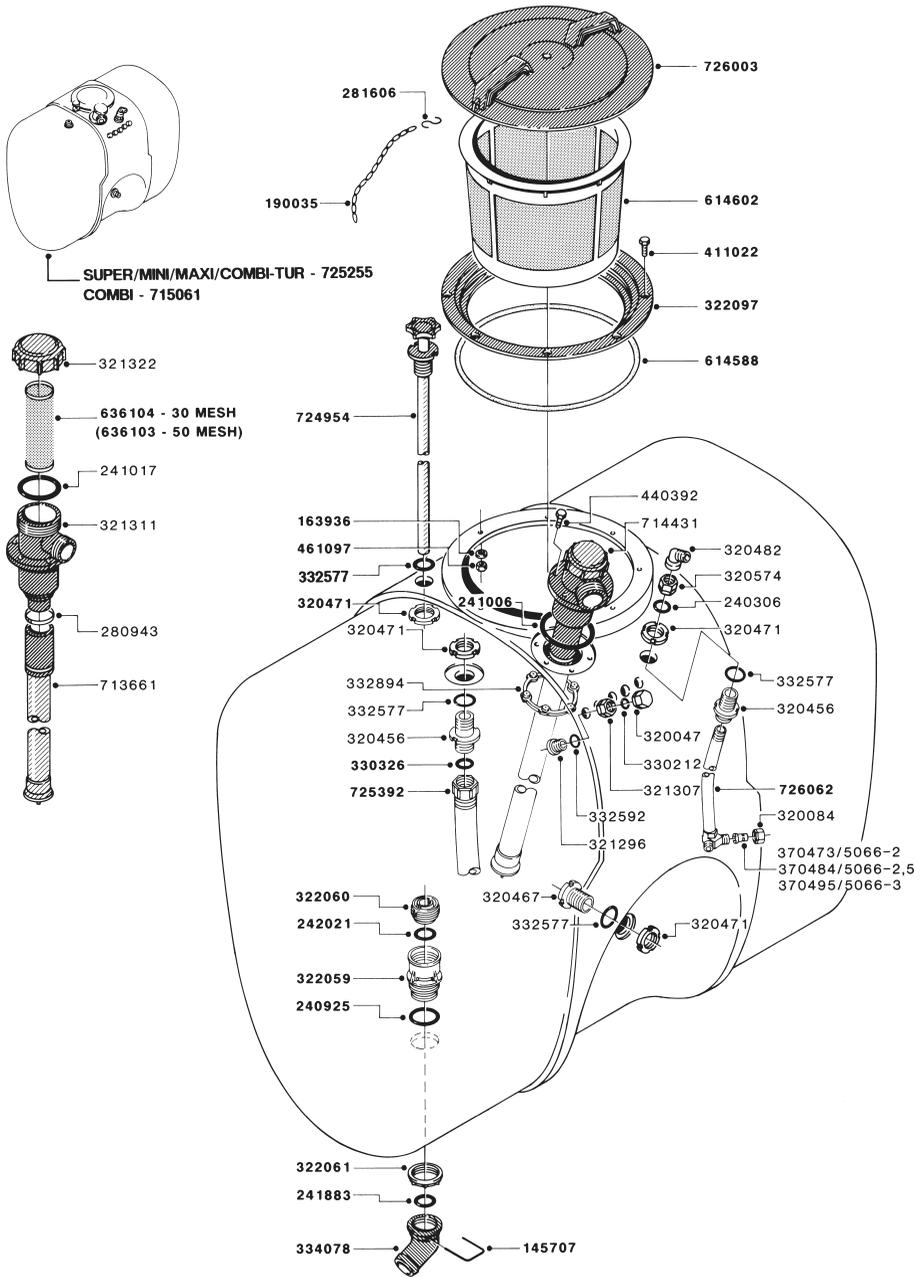
F320 VARIANT-HY 6/8

NK300 - 726872
 NK400 - 726866



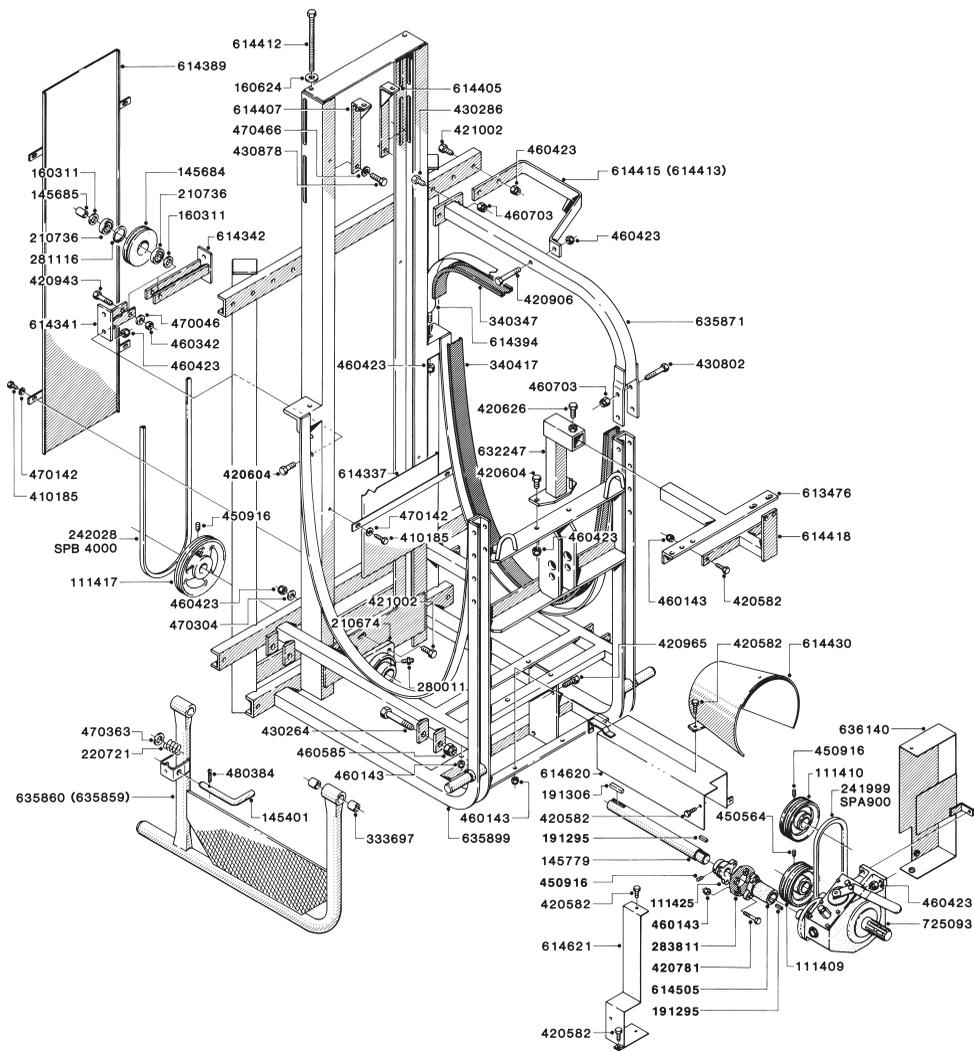
NK 300/400

E5



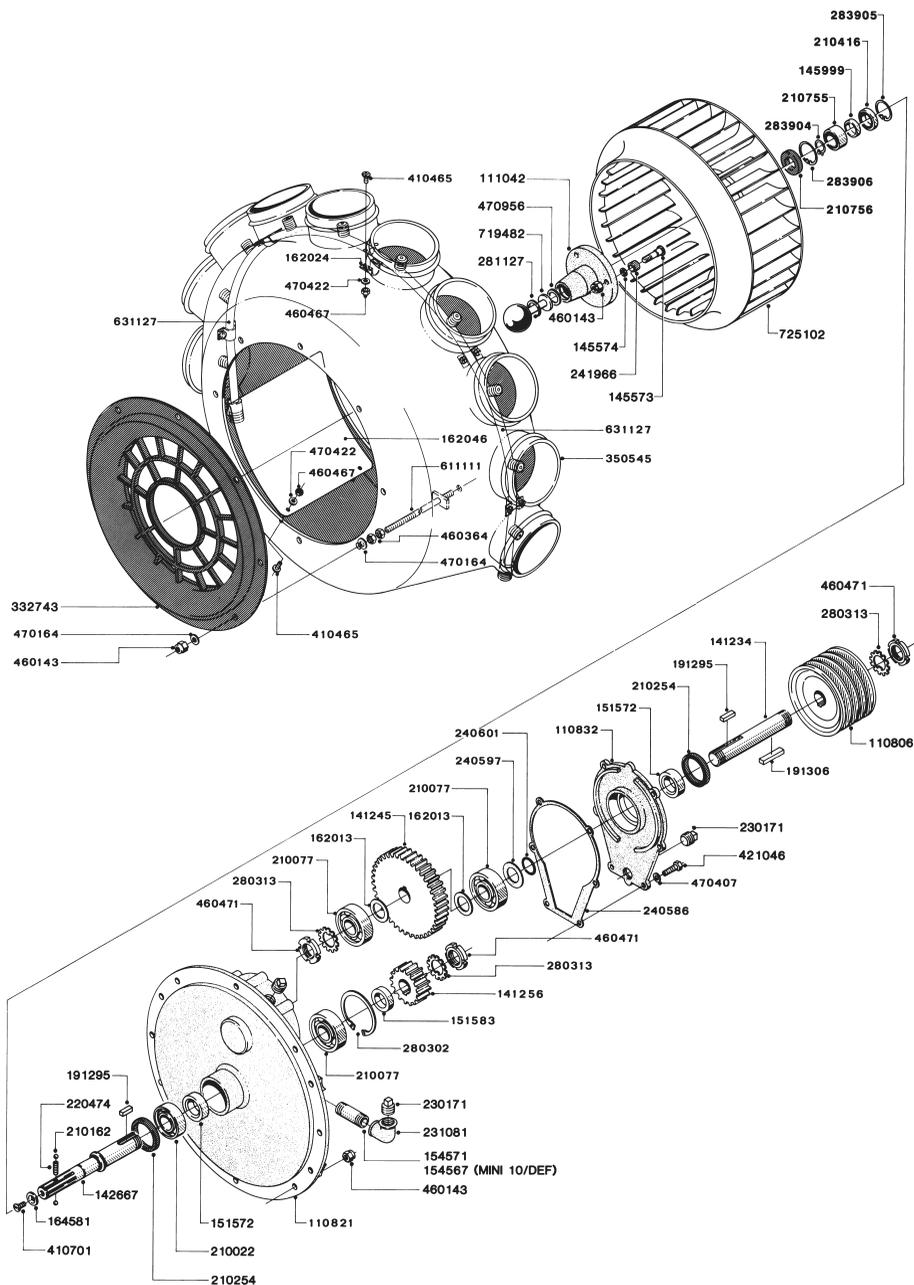
F2

NK-MINI/MAXI/COMBI/SUPER 600



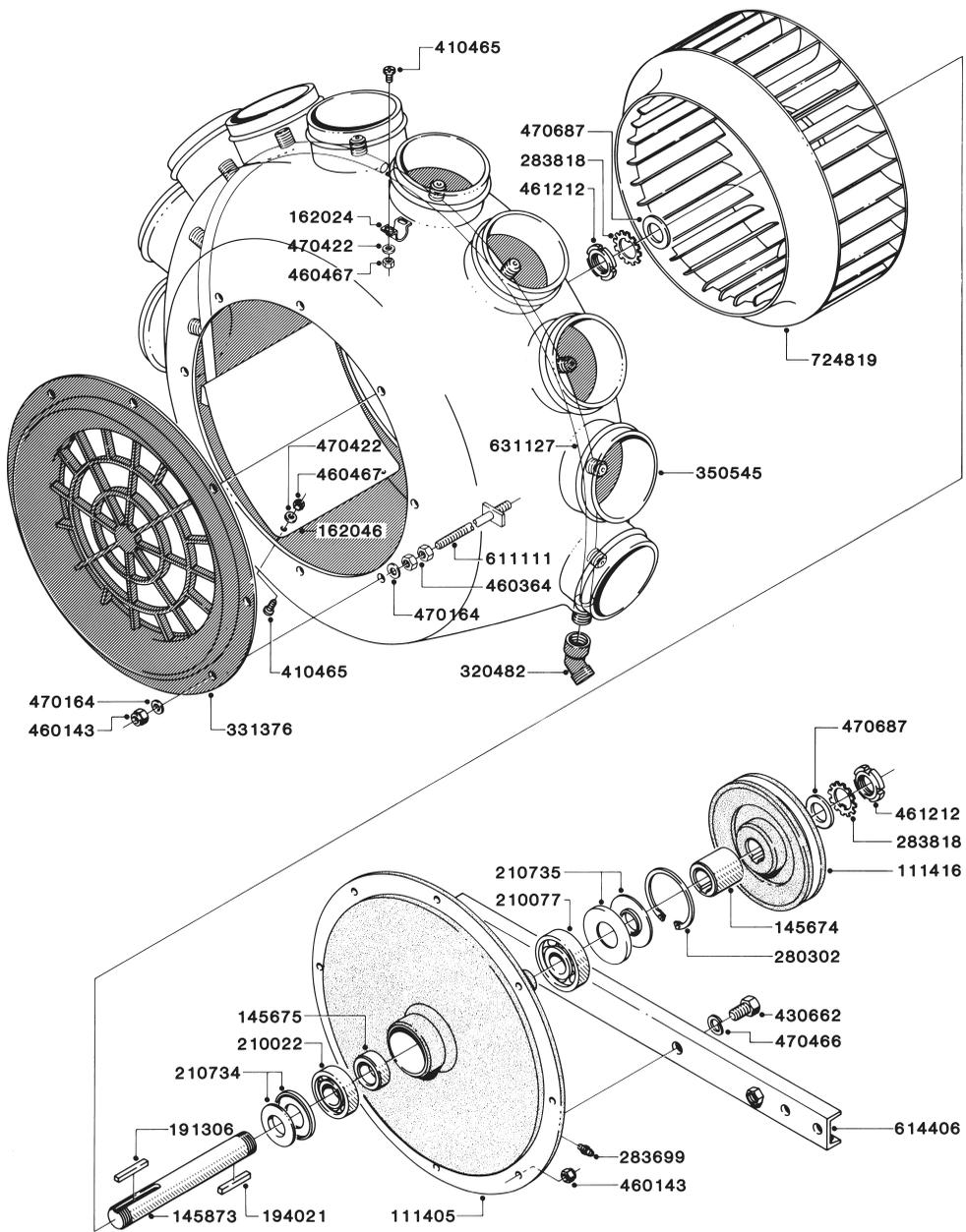
NK-MINI VARIANT 600

F103



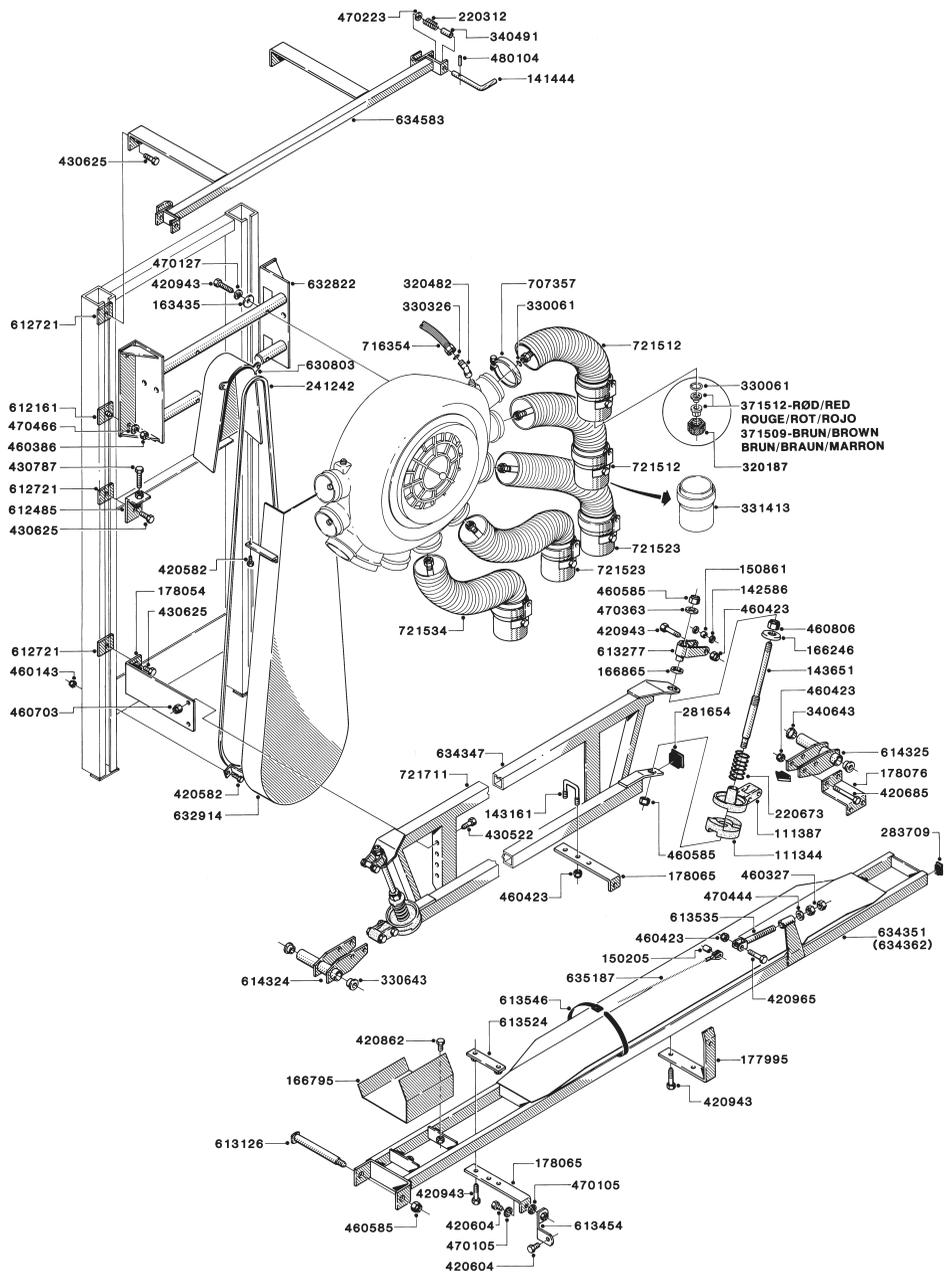
G1

MINI



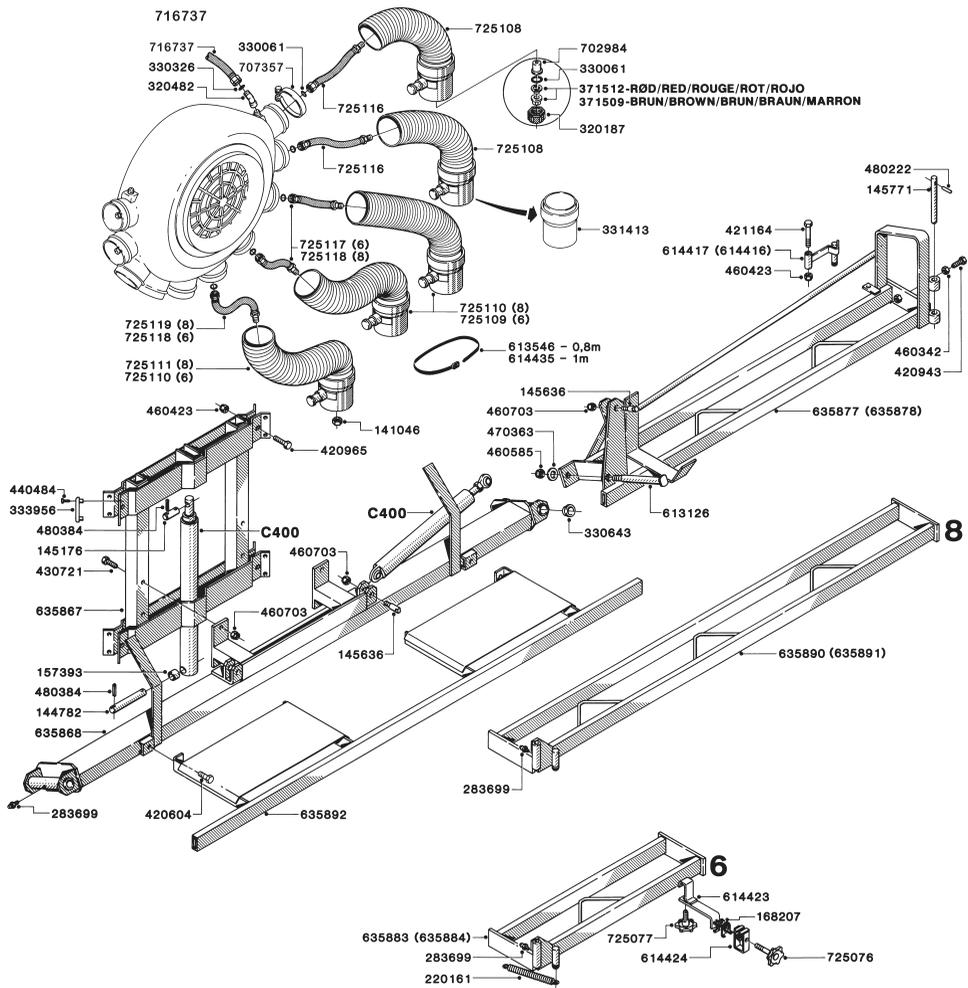
MINI

G2



G104

MINI VARIANT



MINI VARIANT-HY 6/8 m

G105

