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NK / NV

Instruction book

673635-GB-05/2002

HARDI INTERNATIONAL A/S reserve the right to make changes in design or to add new features without any obligation in relation to implements purchased before or after such changes.



EU Declaration of Conformity

Manufacturer,

HARDI INTERNATIONAL A/S
Helgeshøj Allé
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 15.05.2002

Lars Bentsen
Product Development Manager
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.
-  Do not go under any part of the sprayer unless it is secured. The boom is secure when placed in the transport brackets.
-  Do not use the step unless the sprayer is connected to the tractor or the sprayer is correctly placed on a hard, flat surface.
-  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 all NK and NV models, please pay attention to the paragraphs dealing with precisely your model. This book is to be read in conjunction with the Spray Technique book.

Pictorial symbols



Description



Pressure



Function



Cleaning



Connection



Lubrication



Warning



Winter storage



Operating



Operational problems



Service/adjustment



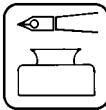
Technical specifications



Liquid flow

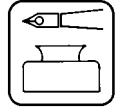


Specific model



Description

The Hardi **NK** models consist of a pump, frame with tank of 300, 400, 600 or 800 litre capacity, BK operating unit, 6, 8, 10, or 12 metre **SB** booms and transmission shaft.



The Hardi **NV** models consist of a pump, frame with tank of 600 or 800 litre capacity and a BK operating unit. The model can be equipped with 10 or 12 metre **MB** trapeze suspended booms and transmission shaft, or with 12 or 12,5 metre **HFM** trapeze suspended booms and transmission shaft.

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

The tank, made of 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, safety valve, on/off function, pressure filter with pressure gauge, distribution valves with pressure equalization device and HARDI-MATIC.

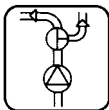
HARDI-MATIC ensures a constant volume per hectare of the liquid at varying speed in the same gear. The number of revolutions on the P.T.O. must be kept between 300-600 r/min.

The **SB** boom is bolted to the tank frame and is fitted with springloaded breakaways at the pivots.

Both the **MB** spray boom and the **HFM** spray boom are supported by a trapeze which is bolted to the tank frame. The trapeze protects the boom against vibrations and shocks when driving on uneven ground. This ensures longer boom life and improves boom stability for an optimal spray pattern. The boom is fitted with spring loaded breakaways at the pivots.

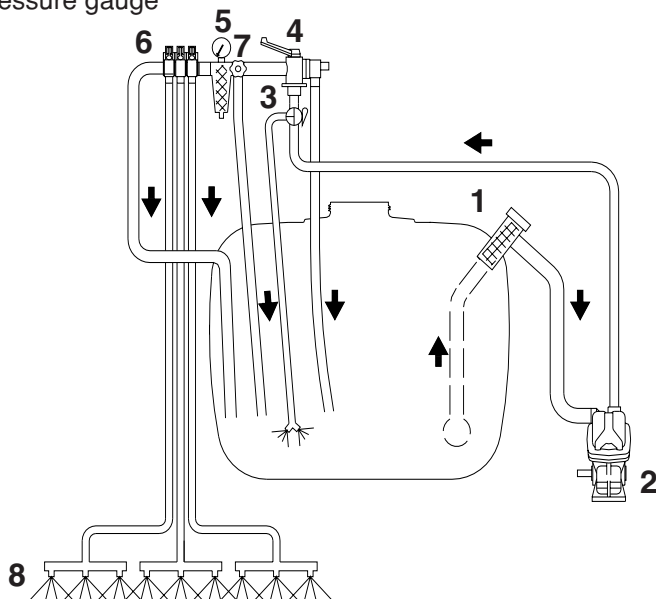
Identification plates

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



Operation diagram

1. Suction filter
2. Pump
3. Pressure agitator valve
4. On/off valve
5. Pressure filter with pressure gauge
6. Distribution valve with pressure equalization
7. HARDI-MATIC
8. Sprayer boom



Before putting the sprayer into operation

Although the sprayer has been applied with a strong and protective surface treatment on steel parts, bolts etc. in the factories, it is recommended to apply a film of anti-corrosion oil (e.g. CASTROL RUSTILLO or SHELL ENSIS FLUID) on all metal parts in order to avoid chemicals and fertilisers discoloring the enamel.

If this is done before the sprayer is put into operation for the first time, it will always be easy to clean the sprayer and keep the enamel shiny for many years.

This treatment should be carried out every time the protection film is washed off.

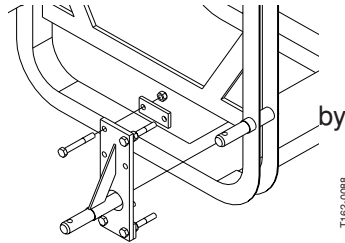
Connecting the sprayer

The sprayer is designed for three point suspension and is factory equipped with 22 mm pivots (category I). Depending on the sprayer model, a conversion kit (ref. no. 833707) can be fitted on the tractor to convert the existing pivots into 28 mm pivots (category II).

Converting category I to II (not 800 litre model)

Mounting of conversion kit:

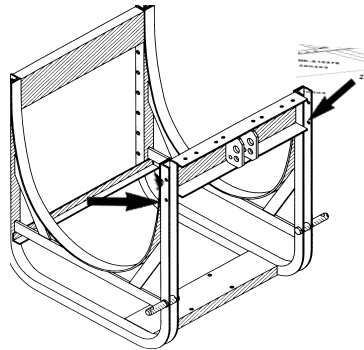
1. Fit the conversion kit on the outside of the existing pivots (bracing structure upwards).
2. Fasten each conversion kit to the frame two mountings and fasten the mountings with two bolts each.



Top link clevis for snap coupler (NK-600 litre model only)

If necessary, a top link clevis (ref. no. 637348) can be mounted on the frame of the NK 600 litre model to enable the snap coupler to be connected on the top link of the sprayer.

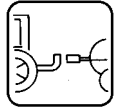
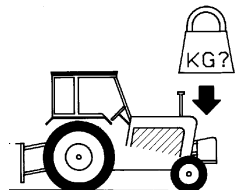
1. Loosen the 4 bolts which fix the top link to the tank frame.
2. Replace this top link with the adapter clevis and fasten it to the frame with the 4 bolts.



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

Generally it is recommended to:

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



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 CV-joints 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.

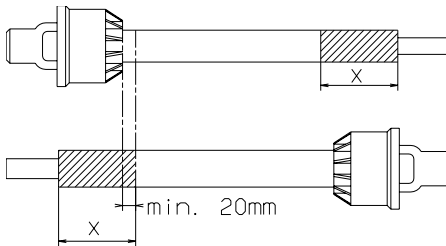
Always STOP ENGINE and remove the ignition key before carrying out maintenance or repairs to the transmission shaft or implement.



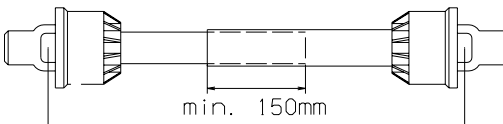
Installation of transmission shaft

Initial installation of the shaft is done as follows:

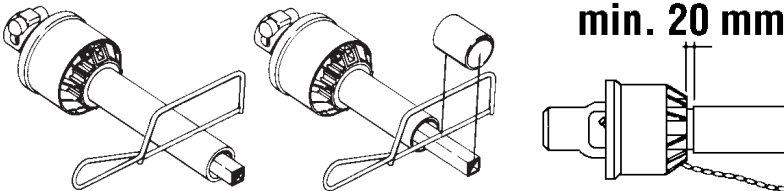
1. Attach sprayer to tractor and set sprayer in the position with **shortest** distance between the tractor and sprayer pump P.T.O. shafts.
2. Stop engine and remove ignition key.
3. If transmission shaft must be shortened, the shaft is pulled apart. Fit the two shaft parts at tractor and sprayer pump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

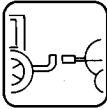


NOTE: The shaft must always have a minimum overlap 150 mm.



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

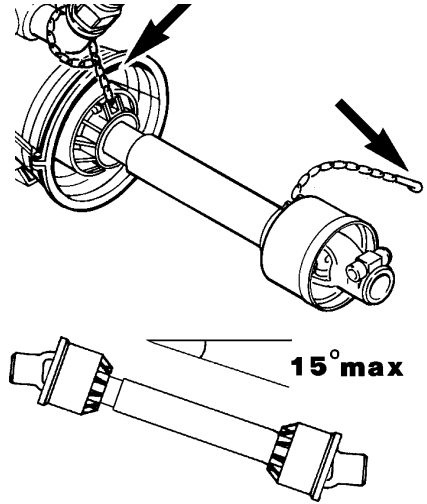




towards tractor. Fit the chains to prevent the protection guards to rotate with the shaft.

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

8. Transmission shafts with cone must be fitted by tightening the Allen screw to a torque of 40 Nm. Check again after 2 minutes use.



Rear lights (if fitted)

Connect plug for rear lights to the tractors 7-poled socket and check that rear lights, stop lights and turning indicators work properly before driving anywhere.

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

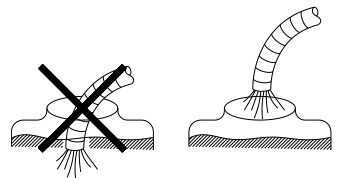
Filling the main tank

Water is filled into the tank by removing the tank lid located at right hand side 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.

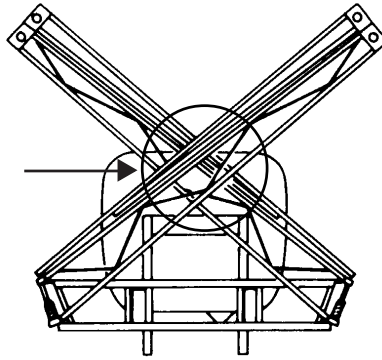
If the hose is lead into the tank and the water pressure drops at the water supply plant, chemicals may be syphoned back and contaminate the water supply lines, plant and well.



Operation of the boom

Remove boom transport lock pin(s). When unfolding (or folding) the initial force to release the spring loaded breakaways will be higher than the actual unfolding/folding.

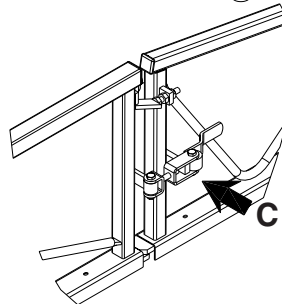
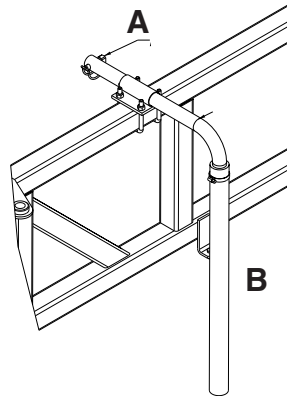
CAUTION: The breakaways must be correctly tensioned and lubricated. (see section on Boom breakaway) Replace boom transport lock pin(s) when driving with folded boom



Operation of the HFM boom

Unfolding the boom

1. Remove the lynch pin **A**.
2. Fold up the transport locking device **B**.
3. Disengage the right side fold of the boom and block the left side fold of the boom with the transport locking device **B**.
4. Unfold the right side fold of the boom.
5. Lock outer section firmly by means of the locking device **C** placed in the fold between inner and outer section. (If necessary, the locking device can be adjusted by revolving the handle).
6. Unfold the left side fold of the boom and use the same procedures as described in point 5.



T033-0002

T033-0001

HFM

Folding the boom

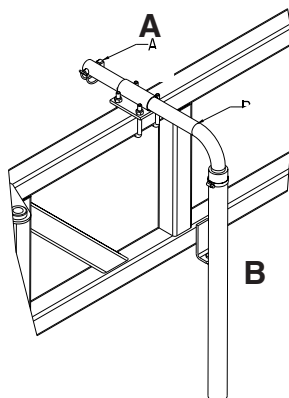
The folding of the boom is carried out in reverse order and with the same procedures as described above in the part "Unfolding the boom", beginning with the left side fold and ending with the right side fold.



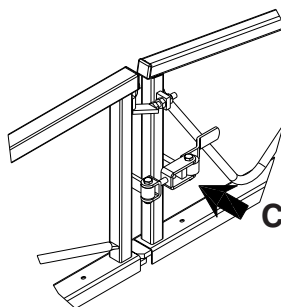
CAUTION: During transportation of the folded boom, it is important that the boom is locked with the transport locking device, which must be secured with the linch pin.

Single side folded boom

1. Remove linch pin **A**.
2. Fold up the boom transport locking device **B**.
3. Disengage the right side fold of the boom and lock the left side fold of the boom with the transport locking device **B** and secure it with linch pin **A**.
4. Unfold the right side fold of the boom.
5. Lock outer section firmly by means of the locking device **C** (If necessary, the locking device can be adjusted by revolving the handle).



T033-0002



T033-0001

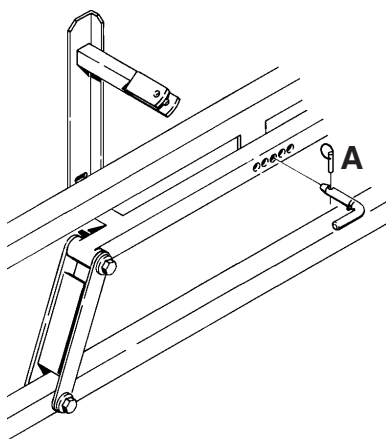
Operation of trapeze (NV-MB model)

The trapeze suspension must be correctly adjusted and regularly lubricated, if it is going to operate satisfactorily.

The primary function of the suspension is to protect the boom against vibrations and shocks. It also helps maintain it a uniform height above the target.

For normal field operation, remove trapeze lock pin **A**.

Replace pin to block function, for example before folding the boom or when spraying on sloping terrain.



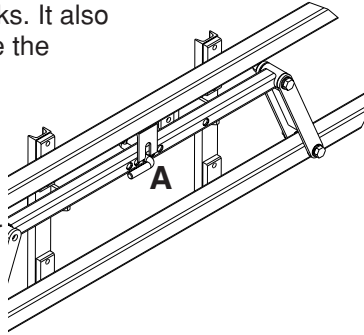
Operation of trapeze (NV-HFM model)

The trapeze suspension must be correctly adjusted and regularly lubricated, if it is going to operate satisfactorily.

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Replace pin to block function, for example before folding the boom or when spraying on sloping terrain.



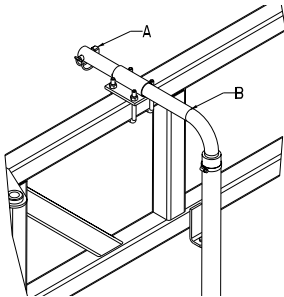
T213-0008

Adjustment of boom height

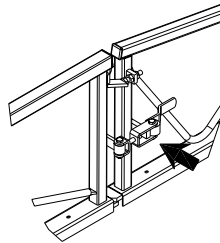
Correct boom height is very important in order to achieve the most optimal spray pattern. (See Spray Technique book).

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

Note: Before adjusting boom height, the boom must be unfolded. On the **HFM** boom the locking device on both right and left fold must be firmly locked.



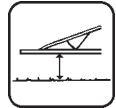
T103-0002

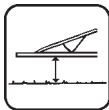


T033-0001

Boom height (without boom lift)

Small adjustments of the boom height can usually be made with the 3-point suspension from the tractor - raising or lowering the sprayer. In crops where greater adjustments are needed, the boom height can be changed manually by removing the 4 bolts holding the boom to the frame. **Note:** This is best done by 2 persons or with a mechanical hoist.

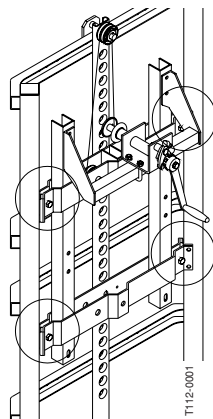
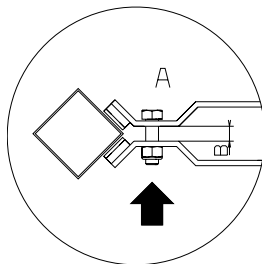




Boom height (with boom lift)

Note: The frame must be greased to allow the 4 slide shoes to glide smoothly on the frame.

Slide shoes: Adjust **A** so gap **B** is equal at all 4 points on the frame.



Hydraulic boom lift (if fitted)

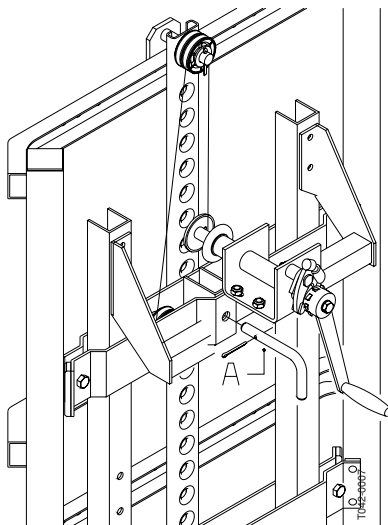
The lowering and raising of the boom is carried out by the hydraulic system. The adjustments are performed stepless through the tractor hydraulic control lever.

Note: The boom lift should be adjusted so the boom can move freely up and down when the cylinder is operated.

Mechanical boom lift (if fitted)



The lowering and raising of the boom is carried out by a winch system. Boom height is adjusted according to the frame punctuation.

1. Pull out the springloaded securing pin **A**, so it is free of its present engagement in the frame
2. Use the winch to raise or lower the boom till it has obtained the required height
3. Engage the securing pin **A** in a matching hole in the frame



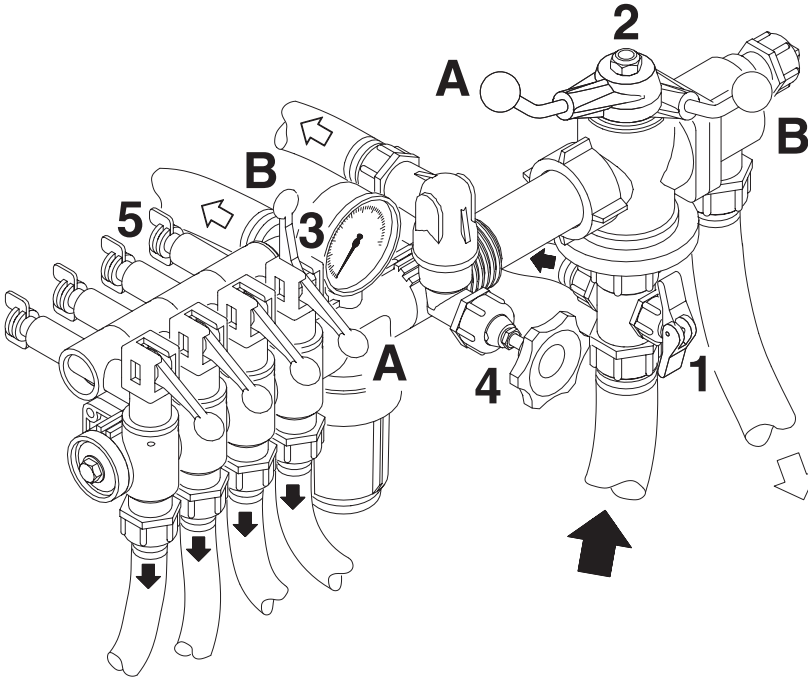
Pulsation damper

The air pressure in the pulsation damper is preset at the factory to 2 bar. This covers 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
15 - 3	0 - 1
3 - 15	1 - 3



Adjustment of the operating unit



1. Choose the correct nozzle. TRIPLET nozzle turrets are turned to the suitable nozzle for the spray purpose. Make sure that all nozzles are of the same type and capacity. See "Spray Technique" book.
2. Open or close lever 1 depending on whether pressure agitation is required. (Remember pressure agitation takes 5% to 10% of pump output).
3. Turn main ON/OFF handle 2 to ON position A.
4. Set all hand levers 3 on the distribution valve to ON position A.
5. Turn the HARDI-MATIC valve 4 anti-clockwise to its extreme position.



- Put the tractor in neutral and adjust the P.T.O. thereby the number of revolutions of the pump corresponding to the intended travelling speed.

NOTE: The P.T.O. revolutions must be kept between 300-600 r/min.

- Adjust the HARDI-MATIC valve **4** so that the pressure gauge indicates the recommended pressure.

ADJUSTMENT OF PRESSURE EQUALIZATION:

- Place the first lever **3** on the distribution valve in OFF position **B**.
- Turn the adjusting screw **5** until the pressure gauge shows the same pressure again.
- Adjust the other sections of the distribution valve in the same way. Hereafter adjustment of pressure equalization will only be needed if you change to nozzles of other capacities.

11. OPERATING THE CONTROL UNIT WHILE DRIVING:

To stop the liquid flow to the boom turn the ON/OFF handle **2** to OFF position **B**. This returns the pump output to the tank through the return system. The diaphragm anti-drip valves ensure instantaneous closing of all nozzles.

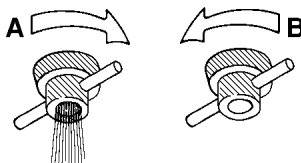
To stop the liquid flow to one or more boom sections, turn lever **3** of the distribution valve to OFF position **B** for the section to be closed. The pressure equalization ensures that the pressure does not rise in the sections which are to remain open.

Drain valve operation

Pressure filter

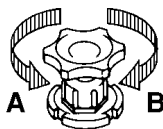
The operating unit has an in-built pressure filter. It is not necessary to dismantle the filter to clean it. When cleaning the sprayer (clean water circulating in the tank), open the drain valve to flush the filter;

- To open: **A**
To close: **B**



Tank drain

- To open: **A**
To close: **B**



Maintenance

In order to derive full benefit from the sprayer for many years the following few but important 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 field you have just sprayed.





- NOTE:** It is advisable to increase the forward speed (double if possible) and reduce the pressure. For S4110 nozzles, pressure may be reduced to 1.5 bar.
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 tank and suction filters and clean. Be careful not to damage the mesh. Replace suction filter top. Replace filters 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 field again or on the soakaway.
 6. After spraying the liquid out, stop the pump and fill at least 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.
The Self-Cleaning Filter can be flushed by removing the bypass hose from the bottom of the filter. Stop the pump and remove the hose. Start the pump for a few seconds to flush filter. Be careful not to loose the restrictor nozzle.
 8. Drain the tank and let pump run dry. Rinse inside of tank, again letting the pump run dry.
 9. Stop the pump. If the pesticides used have a tendency to block nozzles and filters, remove and clean them now. Check also for sediment on the pressure side of the safety valve for the Self-Cleaning Filter.
 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 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.

Suction filter

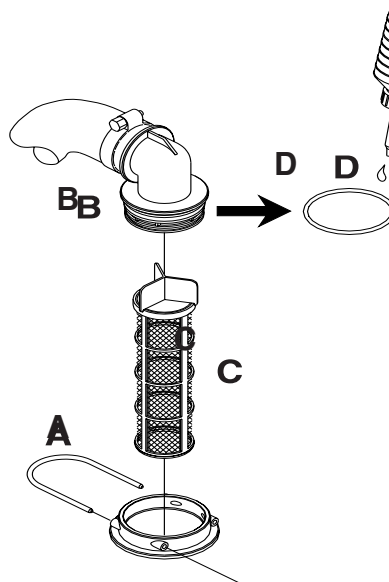
The main filter protecting sprayer components is the suction filter at the top of the tank. Check it regularly.

To service the suction filter:

1. Pull the steel clip **A** out.
2. Lift the suction hose fitting **B** from housing.
3. Filter guide and filter **C** can now be removed.

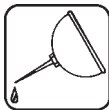
To reassemble:

4. Press the guide onto filter end.
5. Place the filter into housing with guide facing up.
6. Ensure the O-ring **D** on the hose fitting is in good condition and lubricated.
7. Refit the suction hose **B** and steel clip **A**.

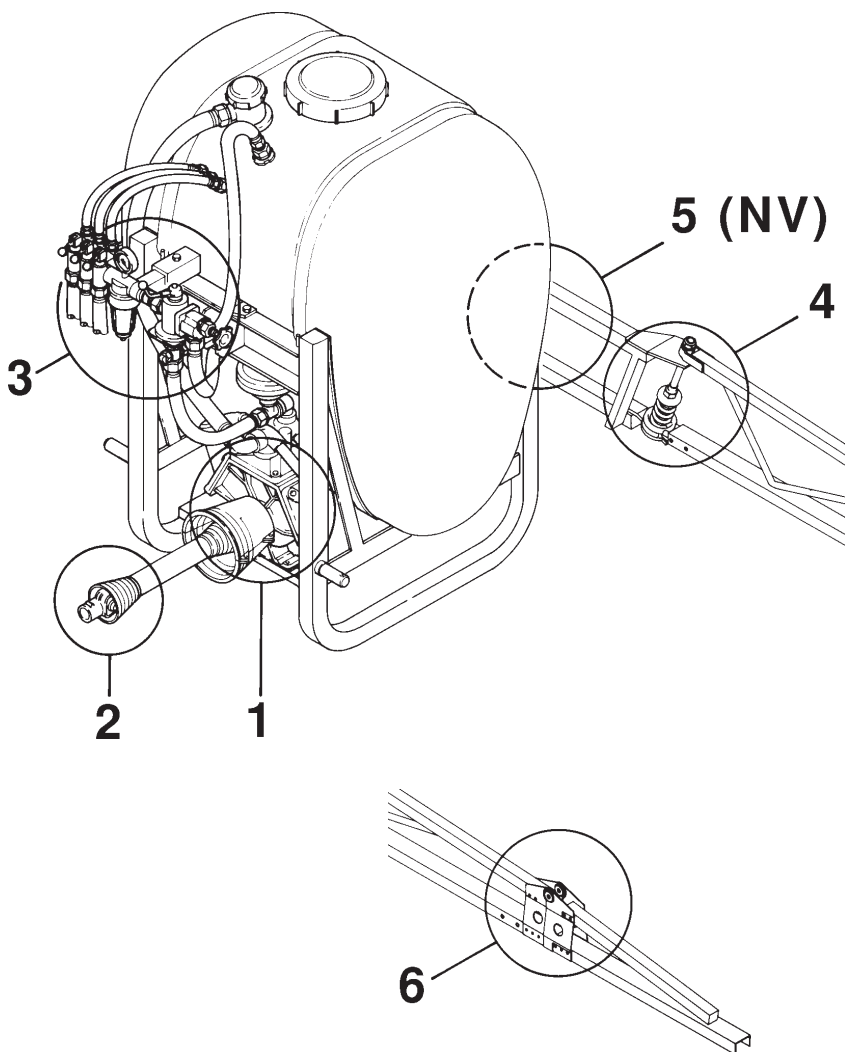


The operating unit has an in-built pressure filter. See section on Drain valve operation.





Lubrication



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

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



 **5** Position on sprayer



Oil



Operation hours



Page to find more information

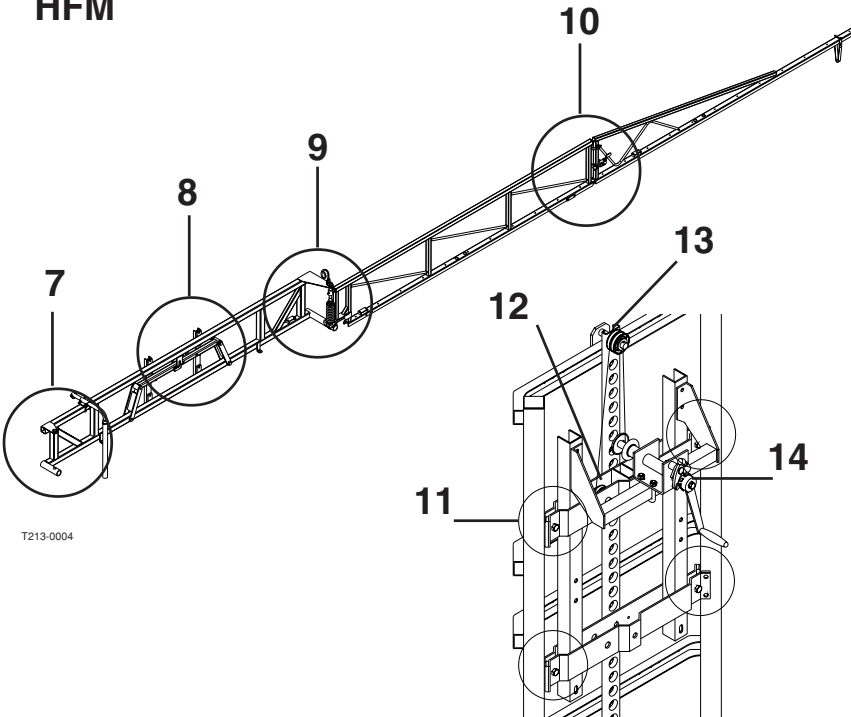


Grease





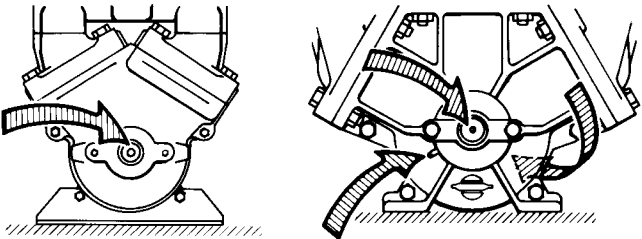
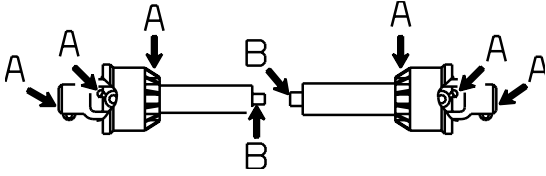
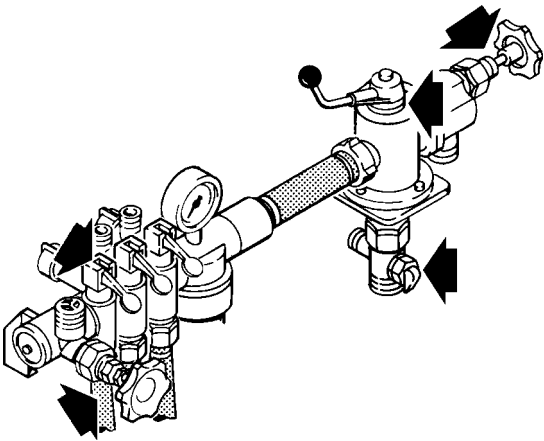
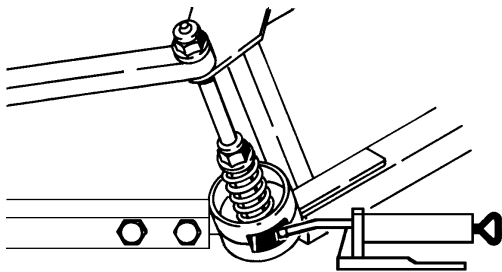






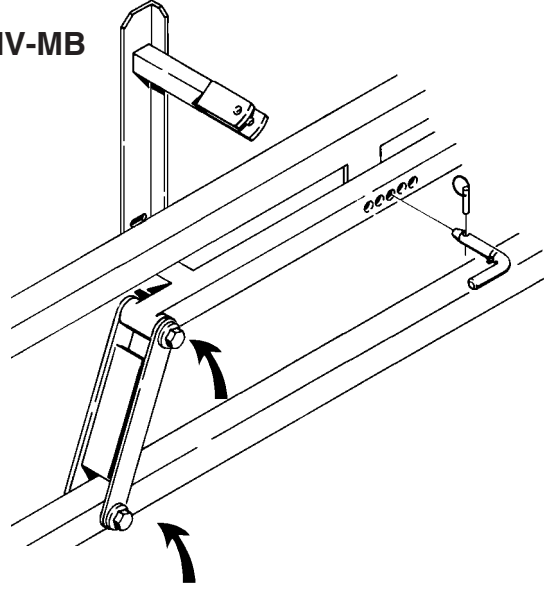
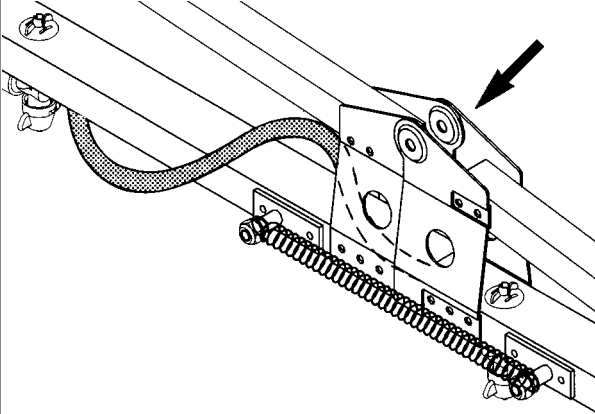
Winter protection/
off-season storage

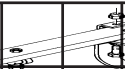

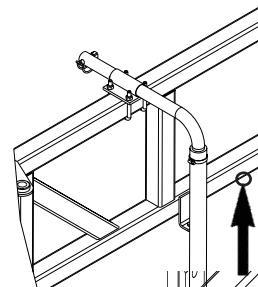
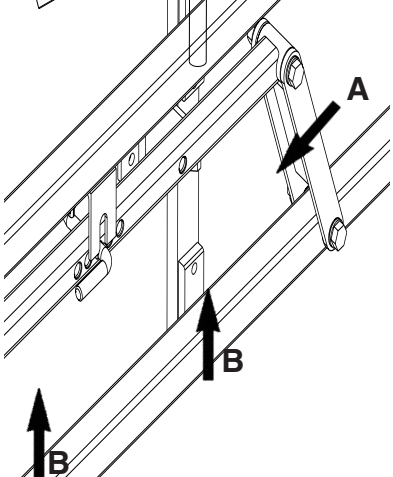
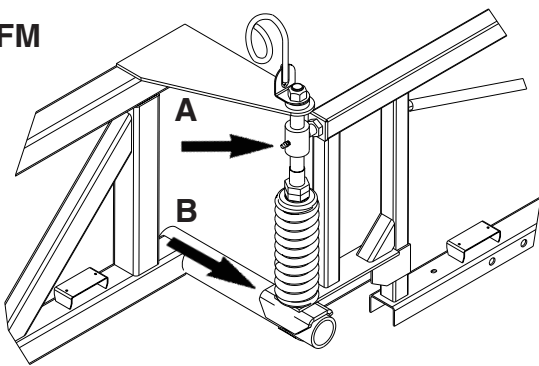
HFM



T213-0004

POS.					
1		X	40		19
2 A B		X X	12 40		9
3	X		20		15
4		X	40		26





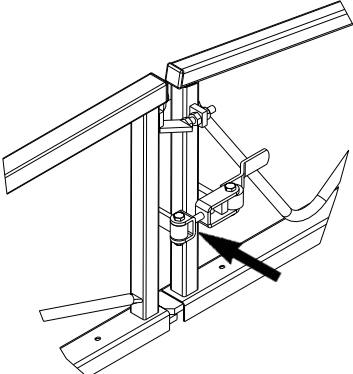
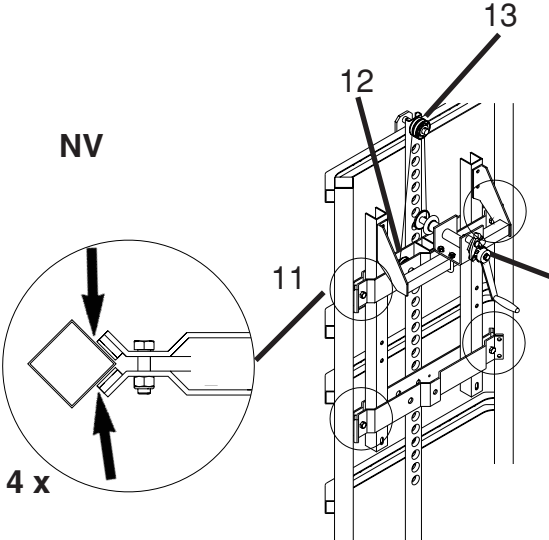
POS.					
5		X	40	<p data-bbox="313 191 420 231">NV-MB</p> 	12
6		X	40		26

					
7	X	50		<p>HFM</p> 	11
8 A B	X X	50 10		<p>HFM</p> 	13
9 A B	X X	50 10		<p>HFM</p> 	28

T213-0007

T213-0008

T213-0005

POS.						
10	X		50	<p data-bbox="400 247 472 279">HFM</p> 		27
11 12 13 14	X X X X	X	10 200 200 200	<p data-bbox="420 885 464 917">NV</p> 	4	14

T213-0006



Re-adjustment of the boom

After having used the sprayer for some days the boom should be adjusted. Before adjusting the boom, please go through this check list:

- Sprayer must be lubricated (See part about Lubrication)
- Tractor and sprayer must be placed on level ground
- Boom must be unfolded
- For NV models: Remove the lock pin for trapeze
- For HFM boom: Locking devices on right and left boom fold must be firmly locked

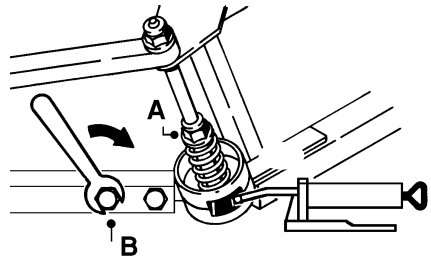


WARNING: Nobody is allowed under the boom whilst adjustment is carried out

Boom breakaway

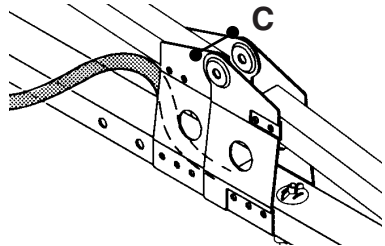
The function of the breakaway is to prevent or reduce boom damage if it should strike an object or the ground. If it is over-tight, it will not function. If it is too loose, it will yawn (forward and back movement) under spraying.

Lubricate coupling before adjusting spring tension. Slacken nut **A** to decrease breakaway resistance. Do not overtighten; better loose than over-tight. Minor adjustments in the field may be necessary. Ensure also channel bolts **B** are tight.



Outer section

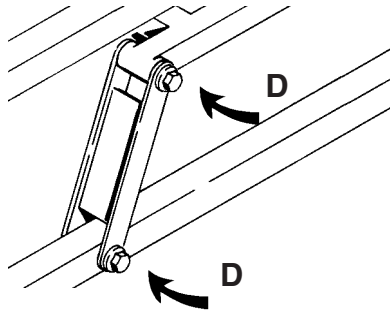
The hinge should be firm. If tight it is difficult to fold. To adjust, tighten or loosen nuts **C**.



Trapeze suspension

For the trapeze to function it must not be over-tight. If it is too loose the boom will yawn. This results in a poor spray distribution. Adjustment is made after having lubricated all pivot points (see section on Lubrication).

Adjust trapeze bolts **D** so it is not too tight nor too loose. Again minor adjustment in the field may be necessary.



HFM boom

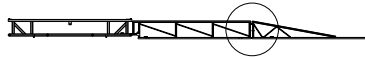
The HFM boom can be adjusted both horizontally and vertically. The alignment reference of the boom is the pipe arrangement on the centre section. Exterior boom sections are aligned accordingly to this.



T103-0003

Vertical adjustment

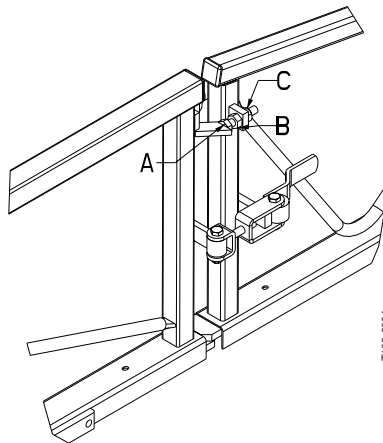
Vertical adjustment is carried out in the fold between inner and outer section.



T103-0002

1. Loosen the locking device, but keep the device engaged to make the boom stay unfolded.
2. Adjust the stop bolt **A** by regulating the self-locking nuts **B** and **C** until the boom wing is linear to the centre section.
3. Lock the boom firmly by means of the locking device. If necessary, the device can be regulated by revolving the handle.

Repeat this procedure on the second boom part.



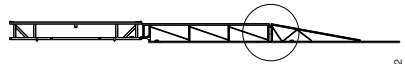
T103-0004





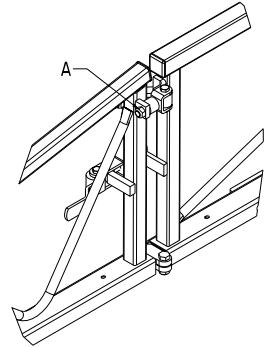
Horizontal adjustment

Horizontal adjustment is carried out in two locations. Begin with adjustment of outer and inner section.



T-103-0002

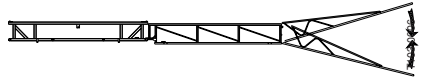
Adjust the lock nut **A** until the two sections are aligned.



T-103-0005

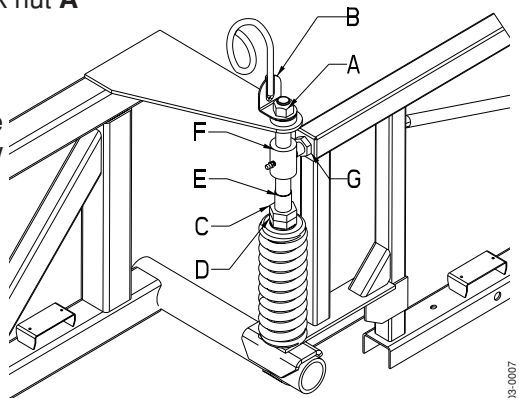
Repeat this procedure on the second boom part.

Proceed with adjustment of centre and middle section.



It will be necessary to place an assisting person, or a small crane, at the fold between inner section and outer section to support and stabilise the boom while adjusting it.

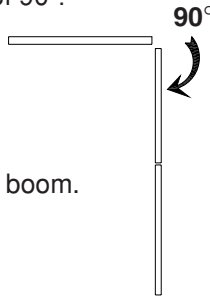
1. Loosen and remove lock nut **A**
2. Remove bracket **B**
3. Un-screw counter nut **C** and nut **D** till they are free of the thread on the pin **E**. The spring is now loosened.
4. Remove the pin **E** from below till it is free of the adjustable hinch **F**
5. Adjust the hinch **F** until boom is aligned
6. Make sure the nut **G** is tightened firmly against the boom profile (Important in order to protect the thread against damages)
7. Reassemble in reverse order



T-103-0007

To find the accurate fix point of nut **D** for the purpose of correct spring tension:

1. Fold the boom section backwards in an angle of 90°.
2. Compress the spring fully by tightening nut **D**.
3. Slacken nut **D** one revolution again = fix position.
4. Lock counter nut **C** according to this position.

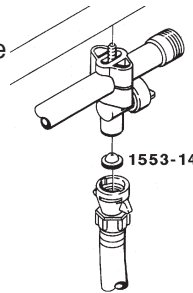


Unfold the boom and inspect the alignment of the boom.
Repeat the procedure on the second boom part.

Drippe hoses for liquid fertiliser

For the application of liquid fertiliser, a specially designed fertiliser equipment can be mounted on the HFM boom. All conventional spray nozzles on the boom are replaced with special drippe hoses which are mounted by the snap-fit principle. The hoses are mounted with an interval of 25 cm.

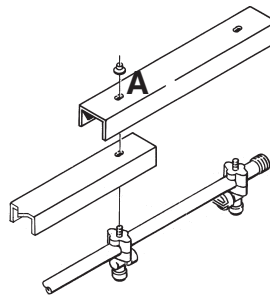
1. Remove the conventional spray nozzles from the boom
2. Fit a fertiliser tube on each non-drip valve



IMPORTANT: Concerning the drippe hose placed at the tip (both right and left hand side): The spray-nozzle "1553-14" must be replaced with a spray nozzle "1553-10", which provides half capacity in order to achieve correct application rate in the lap.

Note: When re-mounting the conventional spray nozzles on the boom, remember that each second spray nozzle must be a "blind cap" in order to obtain correct spraying pattern (50 cm interval).

On the 12,5 metre HFM boom an extension profile **A** must be mounted at each boom tip before fitting the fertiliser equipment.



For further information, please refer to instructions accompanying the fertiliser equipment.



T103-0008

T162-0091

T162-0089



Changing of valves and diaphragms

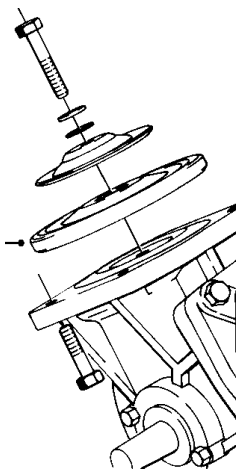
Valves

Remove valve cover (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 gaskets (3) when changing or checking the valves.

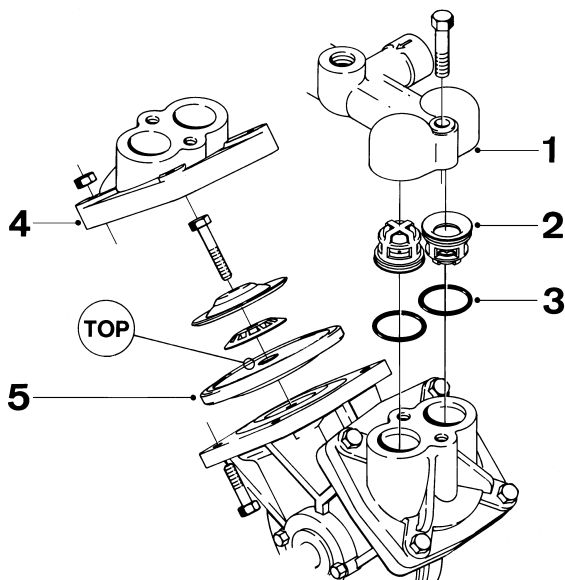
Diaphragms

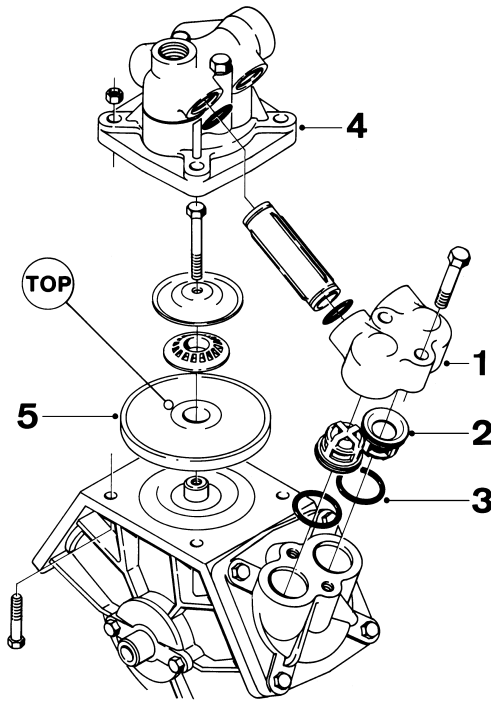
Remove the diaphragm cover (4) after having dismantled the valve cover. The diaphragm (5) may then be changed. If fluids have reached the crankcase, re-grease the pump thoroughly. Check also the drain hole at the bottom of the pump is not blocked.

Model 600



Model 1202



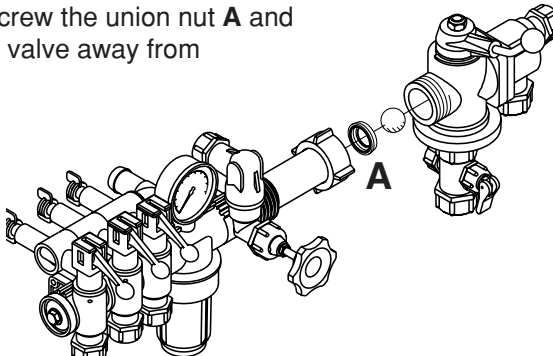


Changing of ball seat in operating unit

If problems with on/off valve occurs (dripping nozzles when on/off valve is closed), the ball and ball seat should be checked.

Remove the 2 bolts fixing the on/off-pressure valve unit to the bracket, unscrew the union nut **A** and pull the on/off-pressure 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.





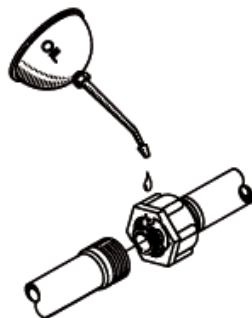
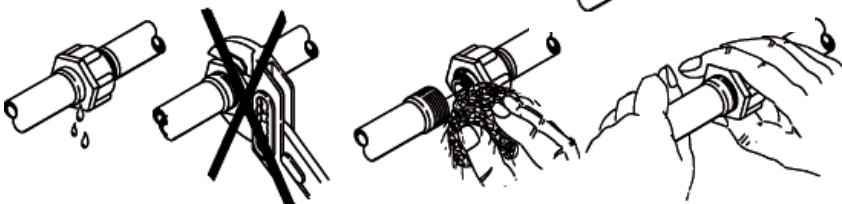
Nozzle tubes and fittings

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

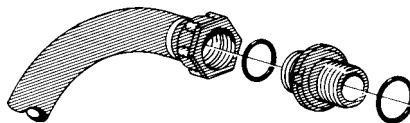
Therefore, in case of leaks: **DO NOT** over-tighten. Disassemble, check condition and position of O-ring or gasket, clean lubricate and reassemble.

For **radial** connections only hand tighten them



The O-ring must be lubricated **ALL THE WAY ROUND** before fitting on to the nozzle tube.

For **face** connections, a little mechanical leverage may be used.

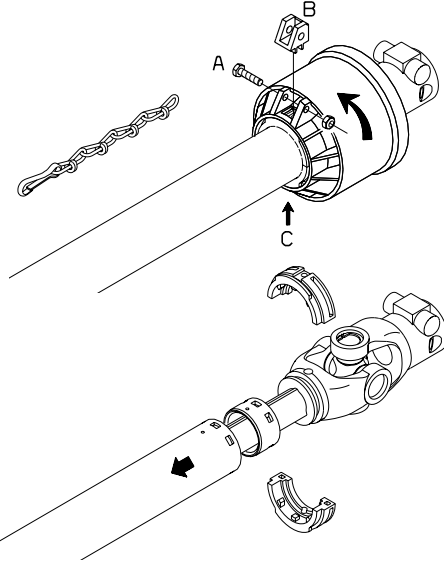


Replacement of transmission shaft protection guards

The replacement of defective protection guards is easy to do.

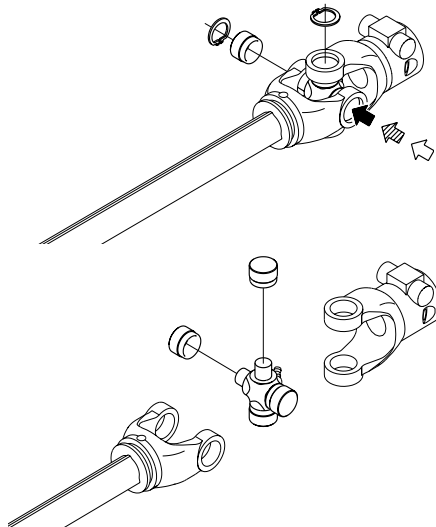
1. Remove bolt **A**, lock **B** and grease nipple **C**. Twist uni CV-joint cover 1/4 turn and pull it backwards.
2. Remove the synthetic bearings and protection tube.
- 2a. Remove inner bush from protection tube.
3. Assemble again in reverse order, using new parts where necessary. Remember to fit chains again.
4. Grease bearings.

Use only genuine HARDI spare parts to service the transmission shaft.



Replacement of transmission shaft cross journals.

1. Remove protection guard as described previously.
2. Remove Seeger circlip rings
3. Press the cross journal sideways - use hammer and mandrel if necessary.
4. Remove needle bearing cups and cross journal can now be removed.
5. Carefully remove needle bearing cups from new cross journal and install it in reverse order. Before fitting the needle bearing cups again, check that needles is placed correctly. Avoid dust and dirt in the new bearings.





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 hard 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 Spray Technique book- Cleaning the sprayer.

Operating unit

Take care that the safety valve is completely loosened. The spring is thereby relieved and operation difficulties are avoided at start-up next season.

Transmission shaft

Check that the transmission shaft fulfills its 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 spray hose 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.

Therefore **ALWAYS** check:

1. Suction, pressure and nozzle 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.





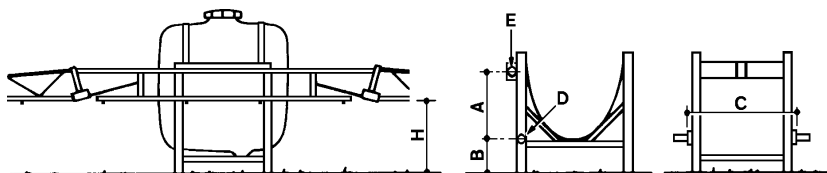
Fault	Probable cause	Control / remedy
Liquid system		
No spray from boom when turned on.	Air leak on suction.	Check if red suction lid/O-ring are sealing.
		Check suction tube and fittings.
		Check tightness of pump diaphragm and valve covers.
	Air in system.	Fill suction hose with water for initial 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.

Fault	Probable cause	Control / remedy
Pressure increasing	Pressure filters beginning to clog.	Clean all filters.
	Agitation nozzles clogged.	Check by turning agitation off/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.
		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.

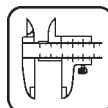


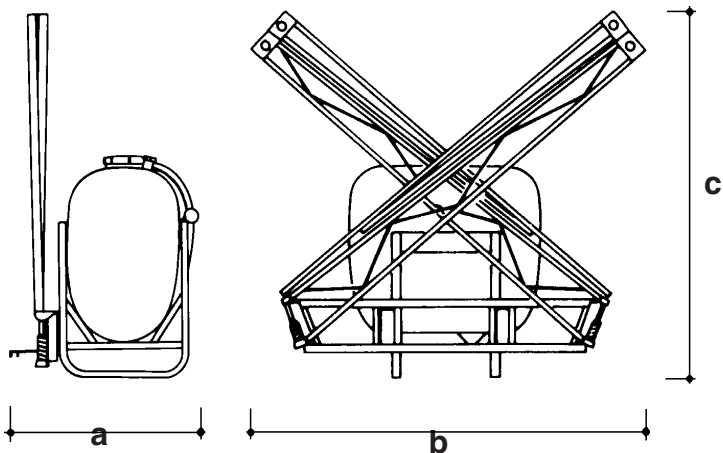
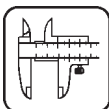
Technical specifications

Measure and weights



Tank size l	Boom height		A mm	B mm	C mm	D ø mm	E ø mm
	Min. H mm	Max. H mm					
NK 300	145	545	490	229	625	22	26
NK 400	131	531	476	229	645	22	26
NK 600	95	575	589	235	645	22	26
NK 800	140	620	634	230	825	28	26
NV 600	0	525	589	235	645	22	26
NV 800	0	570	634	230	825	28	26





NK models

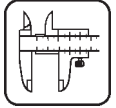
Tank size l	Spraying width m	Pump model	Measure a x b x c cm	Weight kg
300	6	600	140 x 190 x 170	140
	8	600	140 x 190 x 210	146
400	8	600	140 x 190 x 210	156
	8	1202	140 x 190 x 210	166
	10	1202	140 x 190 x 210	171
600	8	600	140 x 190 x 210	173
	8	1202	140 x 190 x 210	184
	10	1202	140 x 190 x 210	191
	10	1302	140 x 190 x 210	197
	12	1302	140 x 256 x 260	209
800	10	1302	140 x 190 x 210	223
	12	1302	140 x 256 x 260	235

NV-HFM model

Tank size l	Spraying width m	Pump model	Measure a x b x c cm	Weight kg
600	12	1202	170 x 262 x 205	348
	12	1302	170 x 262 x 205	360
	12,5	1302	170 x 262 x 205	360
800	12	1202	170 x 262 x 205	373
	12	1302	170 x 262 x 205	385
	12,5	1302	170 x 262 x 205	385

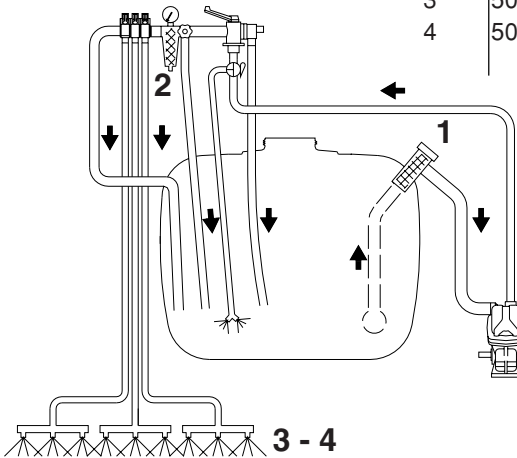
NV- MB

Tank size l	Spraying width m	Pump model	Measure a x b x c cm	Weight kg
600	10	1202	150 x 226 x 220	220
	12	1202	150 x 226 x 220	230
	10	1302	150 x 226 x 220	226
	12	1302	150 x 226 x 220	236
800	10	1202	150 x 226 x 220	245
	12	1202	150 x 226 x 220	255
	10	1302	150 x 226 x 220	251
	12	1302	150 x 226 x 220	261

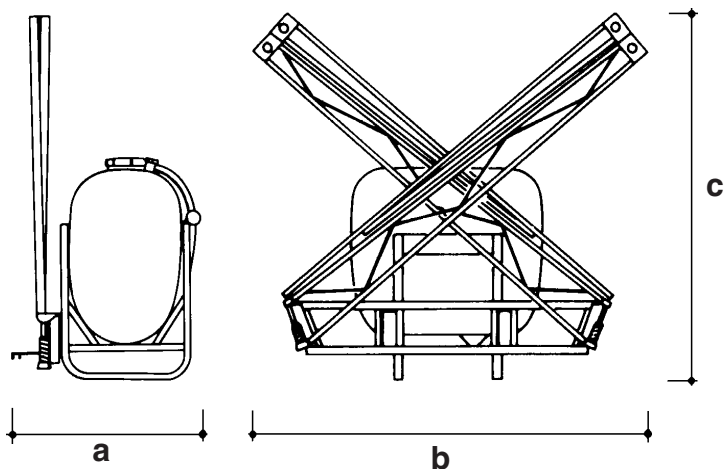
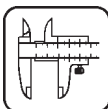


Filters and nozzles

Pos.	Mesh/ colour	Description/ nozzle
1	30	Suction filter
2	50	Pressure filter
3	50 blue	Nozzle 4110-16
4	50 blue	Nozzle 4110-20



T050-0005



NK models

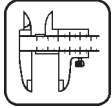
Tank size l	Spraying width m	Pump model	Measure a x b x c cm	Weight kg
300	6	600	140 x 190 x 170	140
	8	600	140 x 190 x 210	146
400	8	600	140 x 190 x 210	156
	8	1202	140 x 190 x 210	166
	10	1202	140 x 190 x 210	171
600	8	600	140 x 190 x 210	173
	8	1202	140 x 190 x 210	184
	10	1202	140 x 190 x 210	191
	10	1302	140 x 190 x 210	197
	12	1302	140 x 256 x 260	209
800	10	1302	140 x 190 x 210	223
	12	1302	140 x 256 x 260	235

NV-HFM model

Tank size l	Spraying width m	Pump model	Measure a x b x c cm	Weight kg
600	12	1202	170 x 262 x 205	348
	12	1302	170 x 262 x 205	360
	12,5	1302	170 x 262 x 205	360
800	12	1202	170 x 262 x 205	373
	12	1302	170 x 262 x 205	385
	12,5	1302	170 x 262 x 205	385

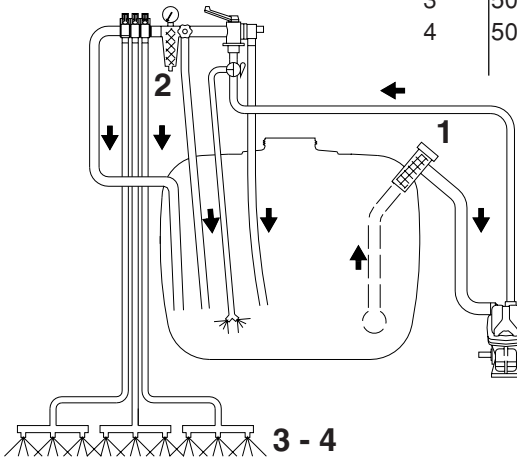
NV- MB

Tank size l	Spraying width m	Pump model	Measure a x b x c cm	Weight kg
600	10	1202	150 x 226 x 220	220
	12	1202	150 x 226 x 220	230
	10	1302	150 x 226 x 220	226
	12	1302	150 x 226 x 220	236
800	10	1202	150 x 226 x 220	245
	12	1202	150 x 226 x 220	255
	10	1302	150 x 226 x 220	251
	12	1302	150 x 226 x 220	261

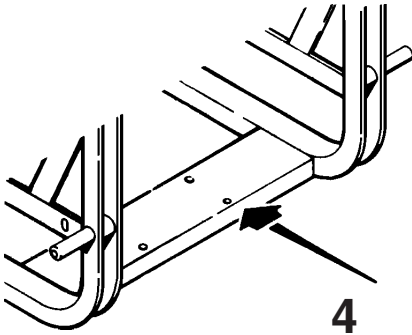
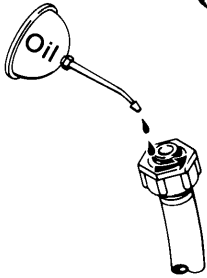
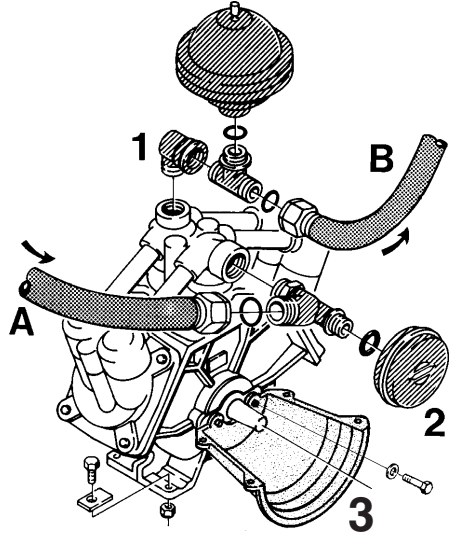
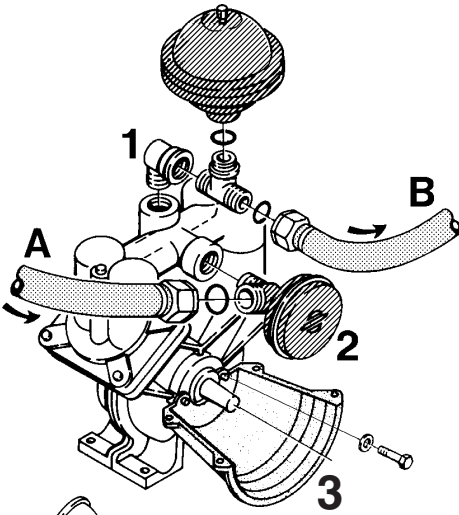


Filters and nozzles

Pos.	Mesh/ colour	Description/ nozzle
1	30	Suction filter
2	50	Pressure filter
3	50 blue	Nozzle 4110-16
4	50 blue	Nozzle 4110-20

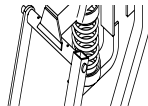


T050-0005

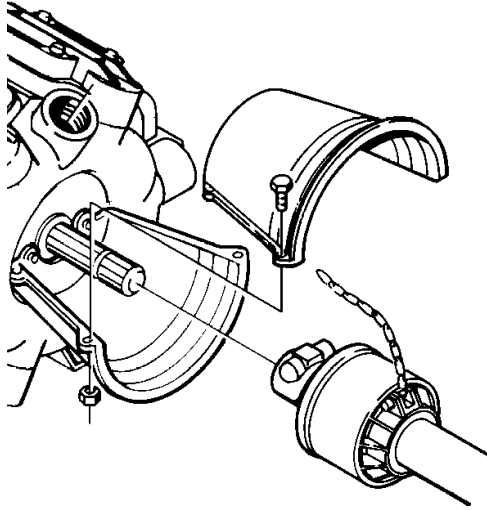


NOTE: Use O-rings where indicated. Lubricate them before assembly. Where O-rings are not indicated, use sealing tape.

1. Fit pulsation damper and pressure hose **B**.
2. Fit suction damper and suction hose **A**.
3. Fit bottom half of yellow protective guard.
4. Bolt pump to console. Position pulsation damper so it fits into cavity.

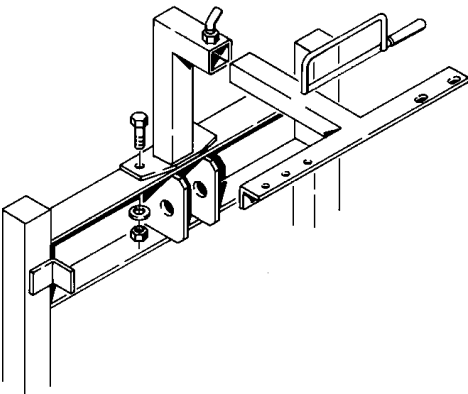


T144-0008
02 01 97

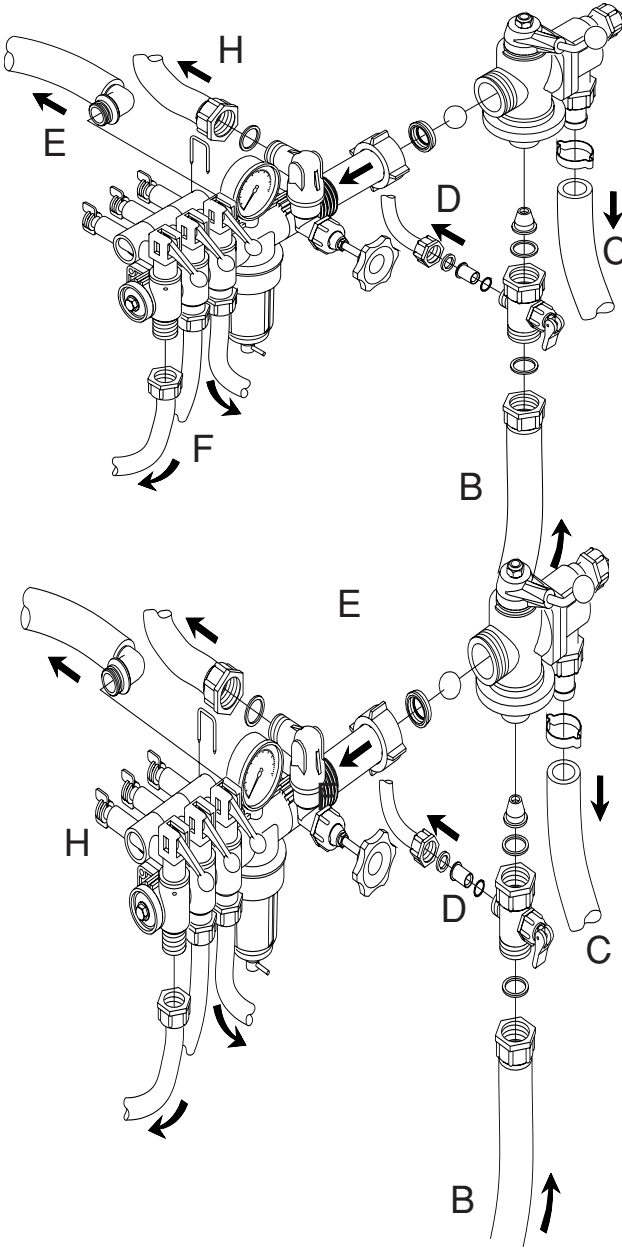


5. Lubricate conical shaft lightly and connect transmission shaft. Attach c to prevent rotation of the protective guard.

Recheck the grub screw is tight after 5 min. of usage.

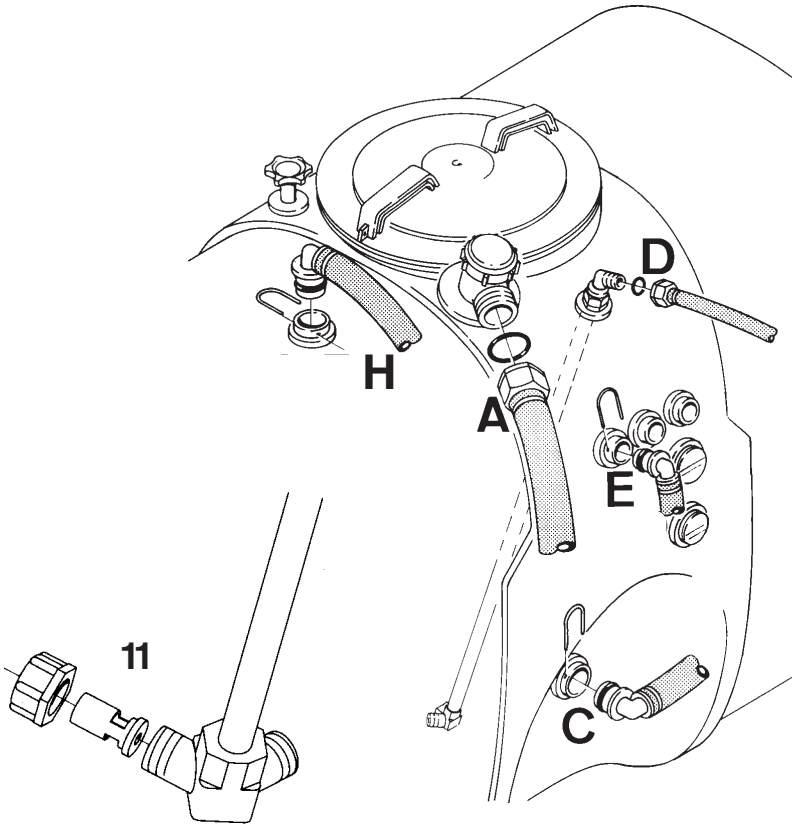


6. Fit operating unit bracket. Rack arm can be shortened if necessary.



7. Assemble operating unit and bolt to rack.
8. Tighten pin bolt nuts approx. 1/2 turn to compensate for possible settling of O-rings.
9. Screw pressure gauge on to filter body. Do not overtighten. See back of gauge. Remember to pierce casing after installation.
10. Fit hoses. Remember to lubricate O-rings before fitting.

B = From pump. Fit agitator valve first
C = Return to tank.
D = For agitation.
E = For pressure equalization.
F = Feed hoses to boom. Shortest hose is for centre section.
H = Return for HARDI-MATIC.

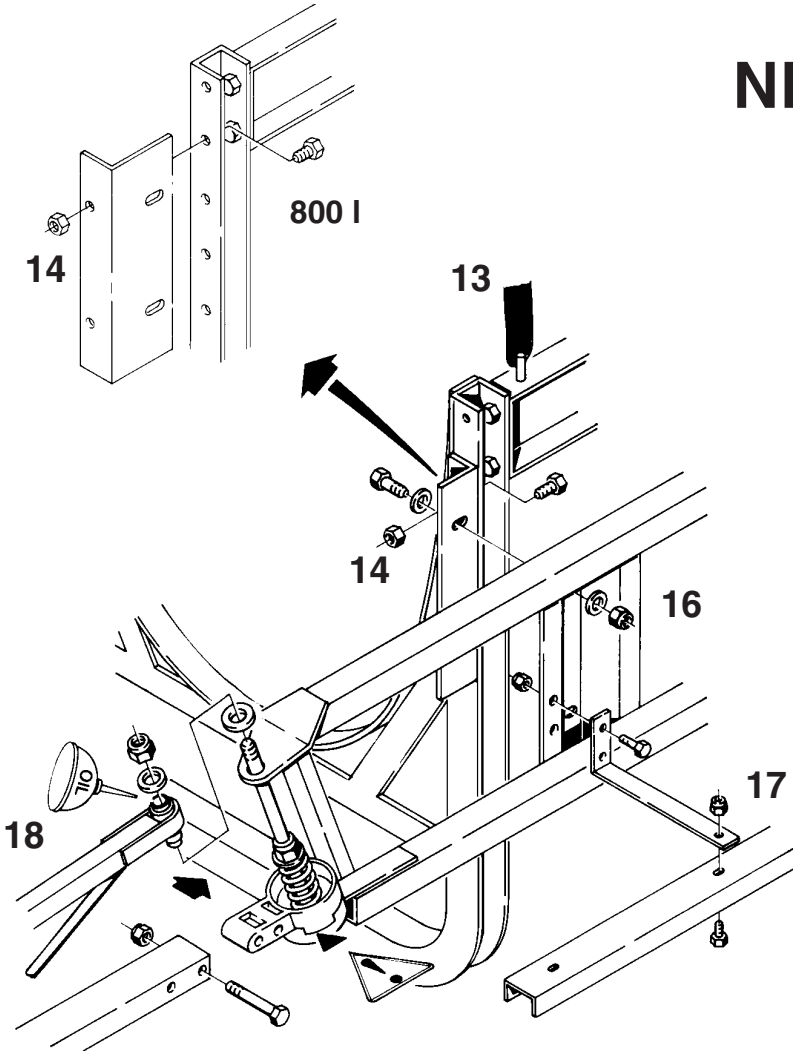


- 11. Fit agitation nozzles. Ensure they do not point towards yellow suction pipe.
- 12. Fit hoses. Remember to lubricate O-rings before fitting.

- A** = Suction hose to pump.
- C** = From ON/OFF valve.
- D** = From agitation valve.
- E** = From pressure equalization valves.
- H** = From HARDI-MATIC.

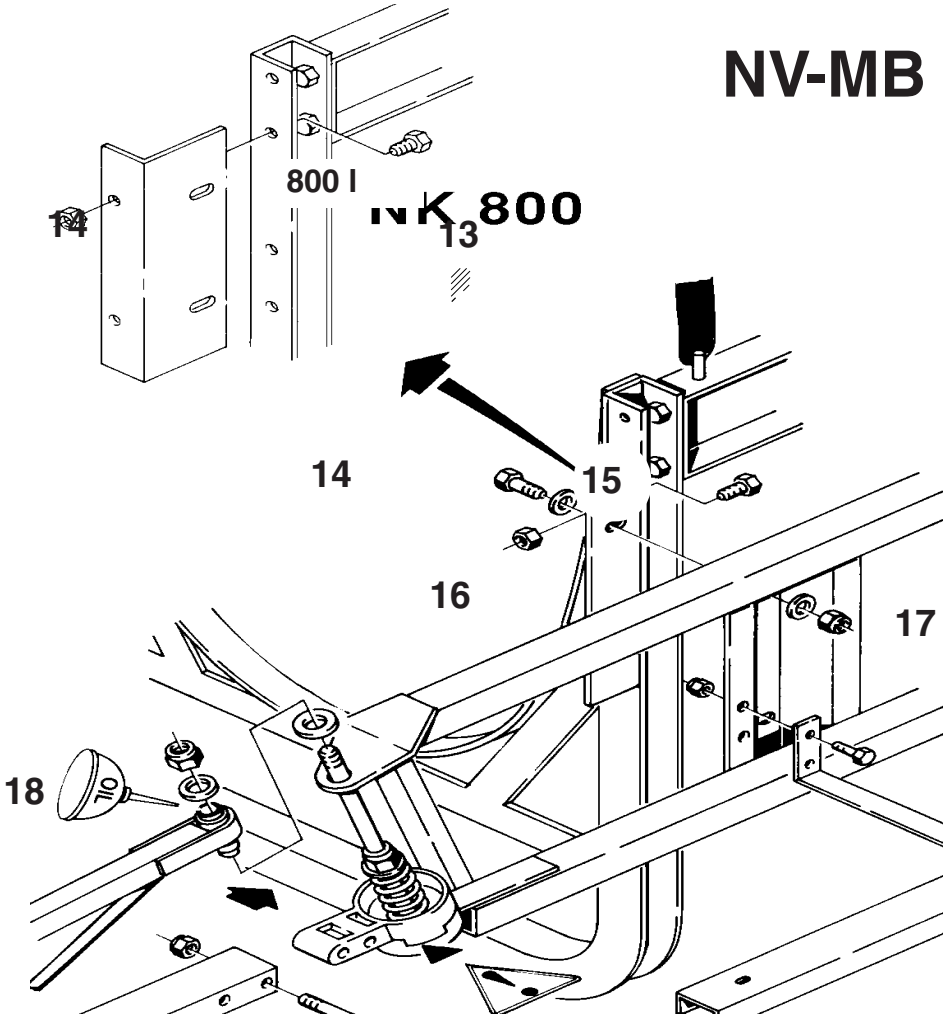
NOTE: For sake of good order, it may be necessary to shorten some hoses (for example, suction hose **A**). This is best done when assembly is completed and before hoses are secured with plastic straps.

NK



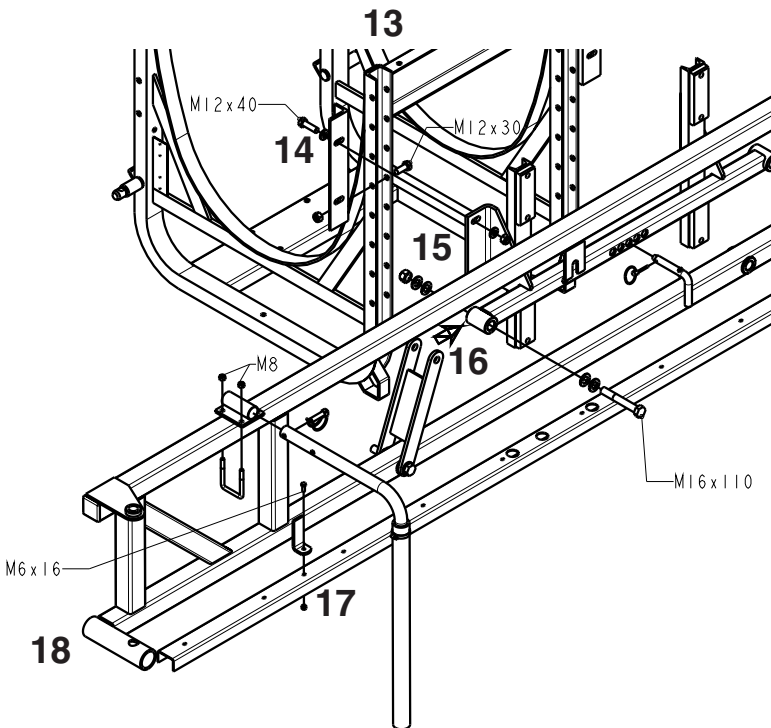
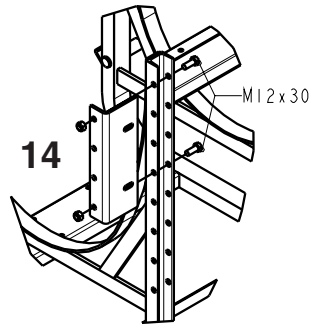
- 13. Tighten black metal tank straps if loose.
- 14. Bolt angle brackets to frame.
- 15.
- 16. Fit boom centre.
- 17. Fit U-profile.
- 18. Fit boom wings. Be cautious when folding boom for the first time.
See section on Boom breakaway.

NV-MB



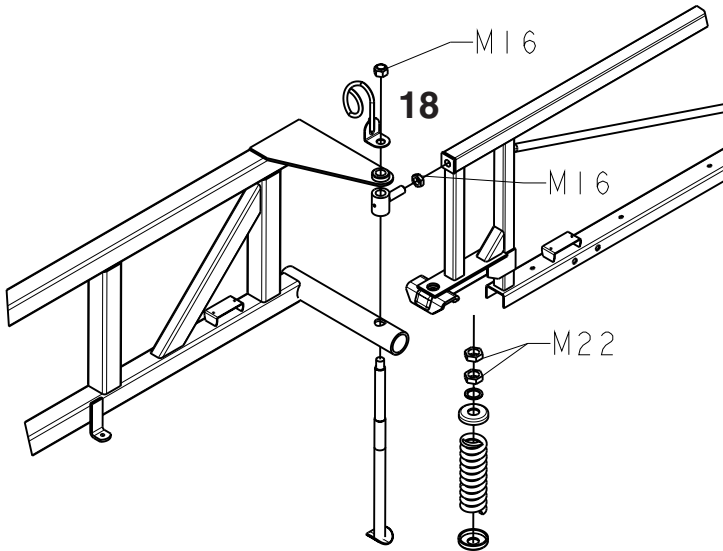
13. Tighten black metal tank straps if loose.
14. Bolt angle brackets to frame.
15. Fit trapeze bridge.
16. Fit boom centre - Note trapeze buckle washers lie between arm and large flat washer.
17. Fit U-profile.
18. Fit boom wings. Be cautious when folding boom for the first time.
See section on Boom breakaway.

NV-HFM



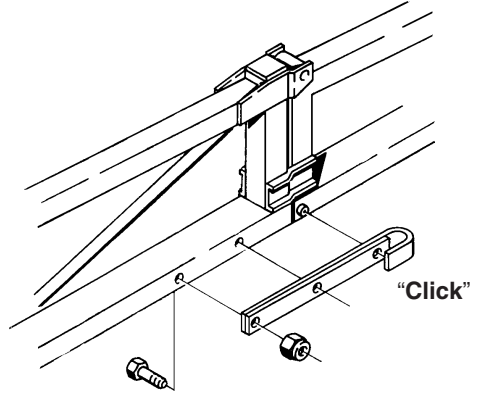
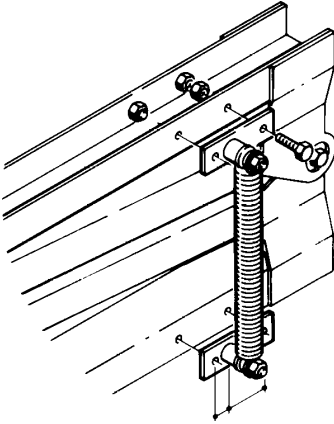
T153-0003

NV-HFM



T153-0002

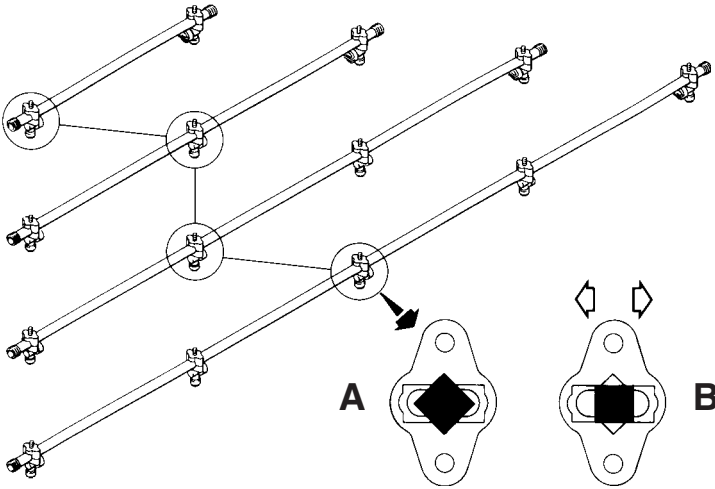
13. Tighten black metal tank straps if loose.
14. Bolt angle brackets to frame.
15. Fit trapeze.
16. Fit boom centre - Note trapeze buckle washers lie between arm and large flat washer.
17. Fit U-profile.
18. Fit boom wings - please refer to section on Horizontal adjustment. Be cautious when folding boom for the first time - see section on Horizontal adjustment.



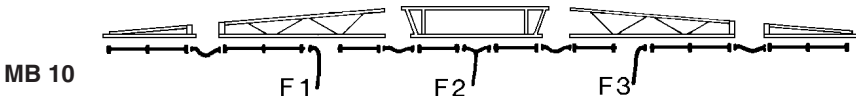
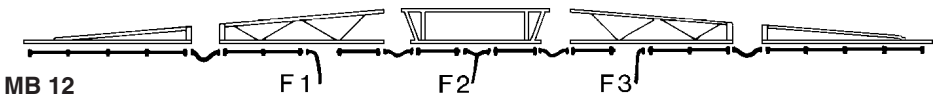
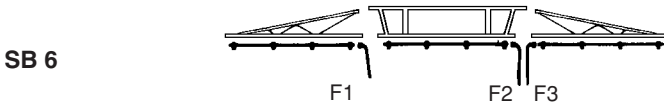
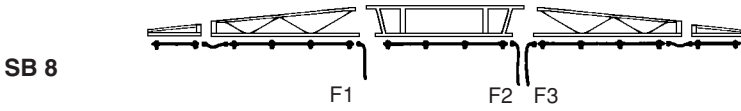
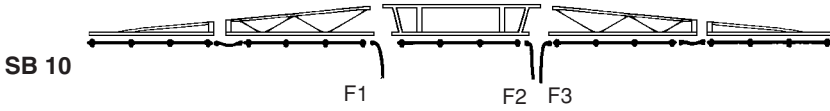
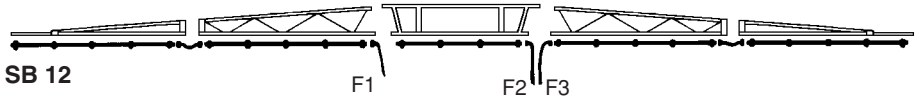
19. Fit outer section springs/locks.

NK model - Note orientation of spring anchor.

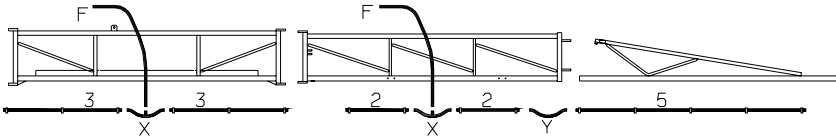
NV model - Do it with the boom unfolded to ensure correct location.



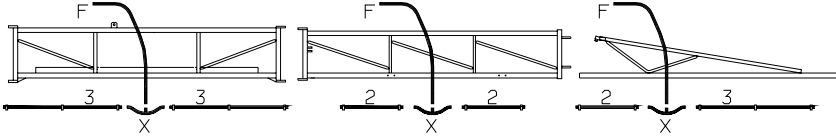
20. Nozzle tubes are supplied with one lock nozzle saddle per tube **A**. The rest can slide lengthwise **B** allowing for extension and contraction.



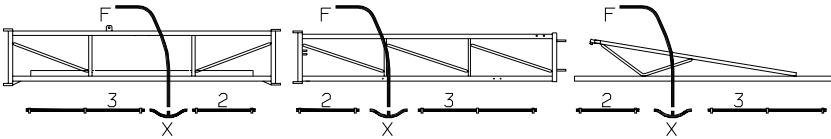
HFM 12M 3 SECTIONS



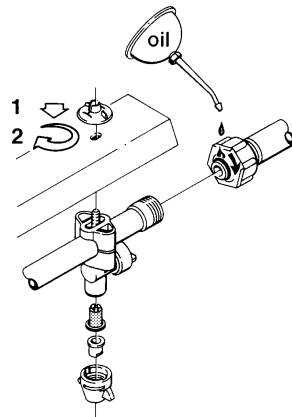
HFM 12M 5 SECTIONS



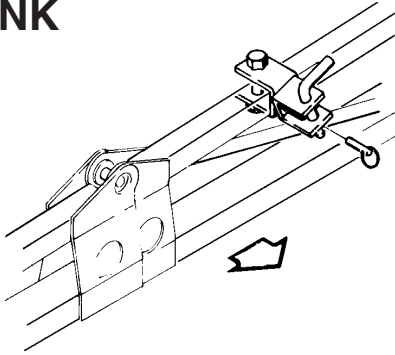
HFM 12.5M



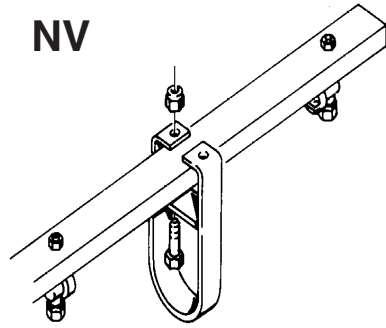
21. Tubes and hoses are connected.
Fit tubes using synthetic nut. Press
down 1, turn 2. **Do not over-tighten.**
Fit filter and COLOR TIPS.
REMEMBER: Lubricate O-rings
before fitting.



NK

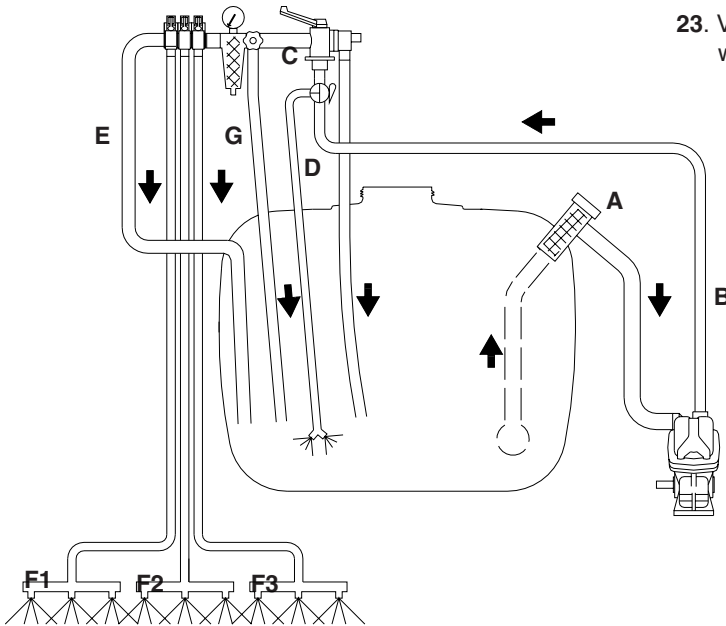


NV



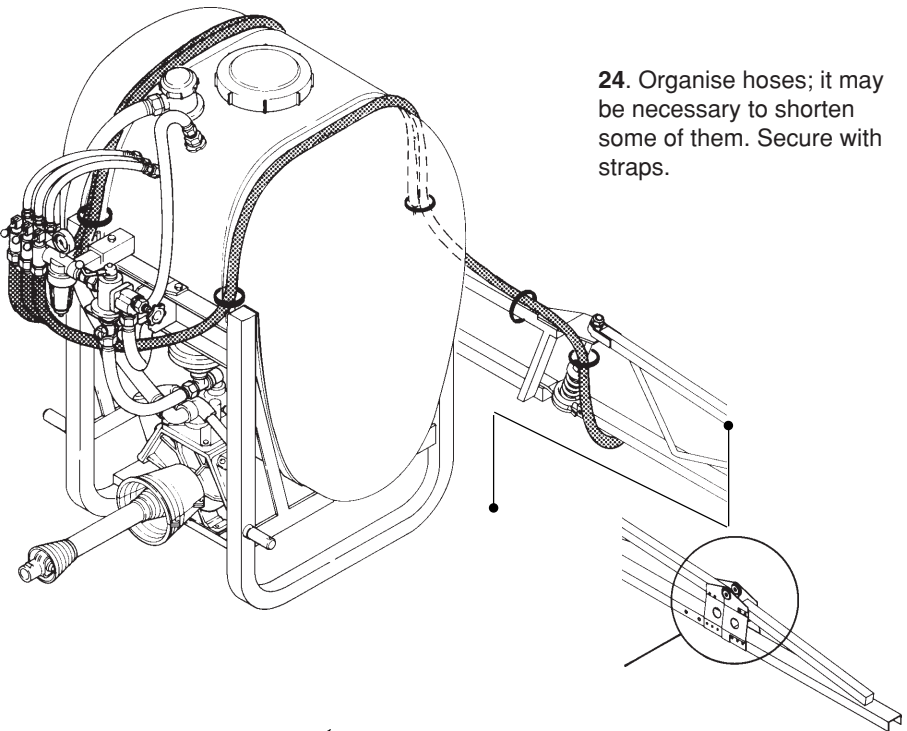
22. NK model - Fit boom transport lock. Arrow indicates forward direction of travel.

NV model - Fit end guard (small plate goes underneath).
It must be approximately between the last two nozzles.

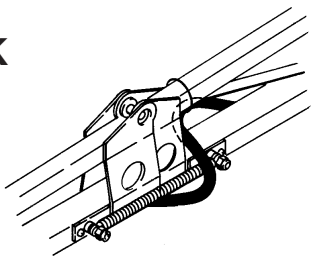


23. Verify connections with diagram.

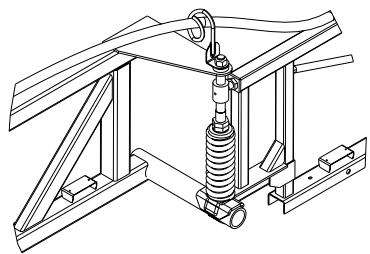
24. Organise hoses; it may be necessary to shorten some of them. Secure with straps.



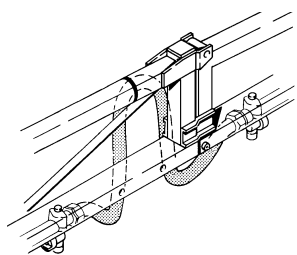
NK

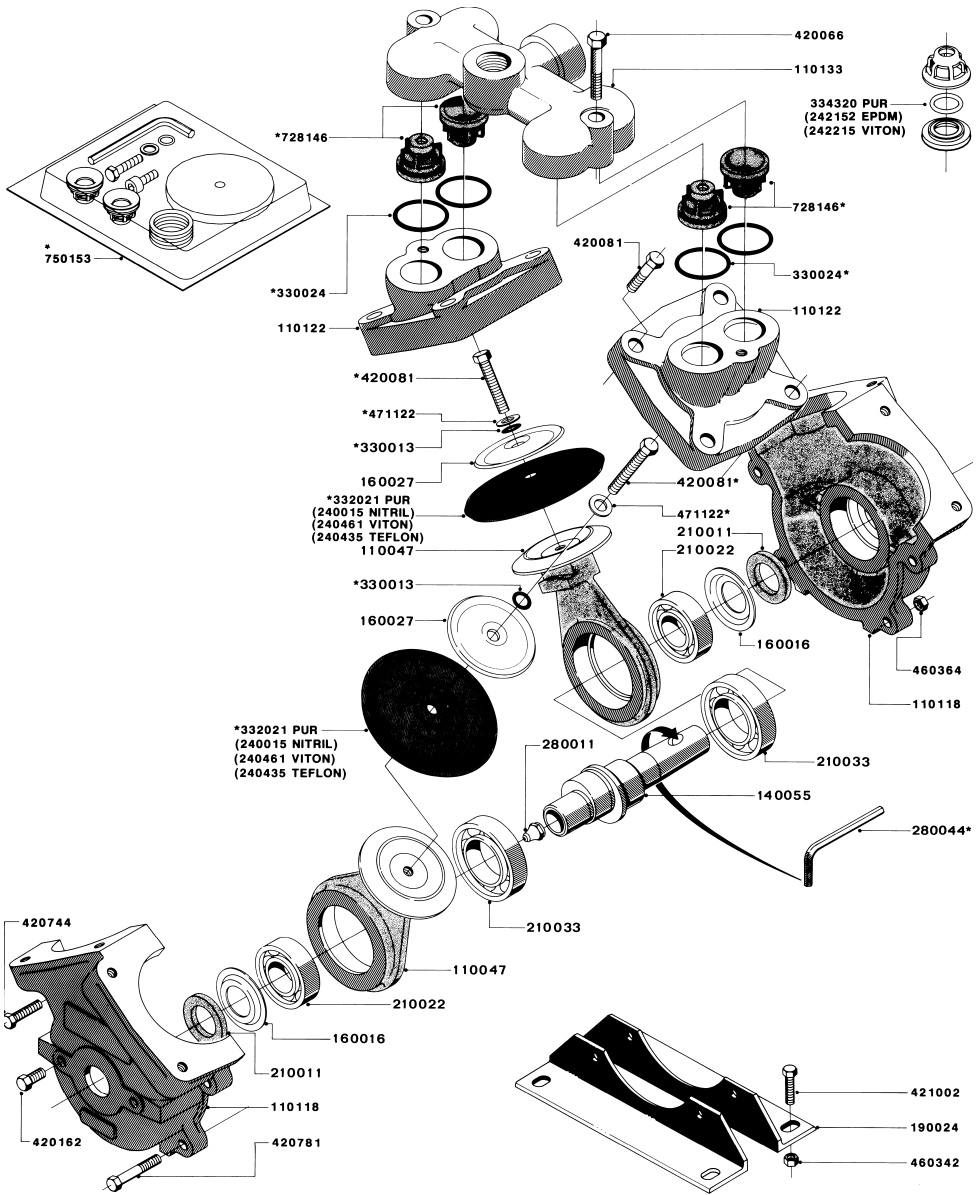


NV-HFM



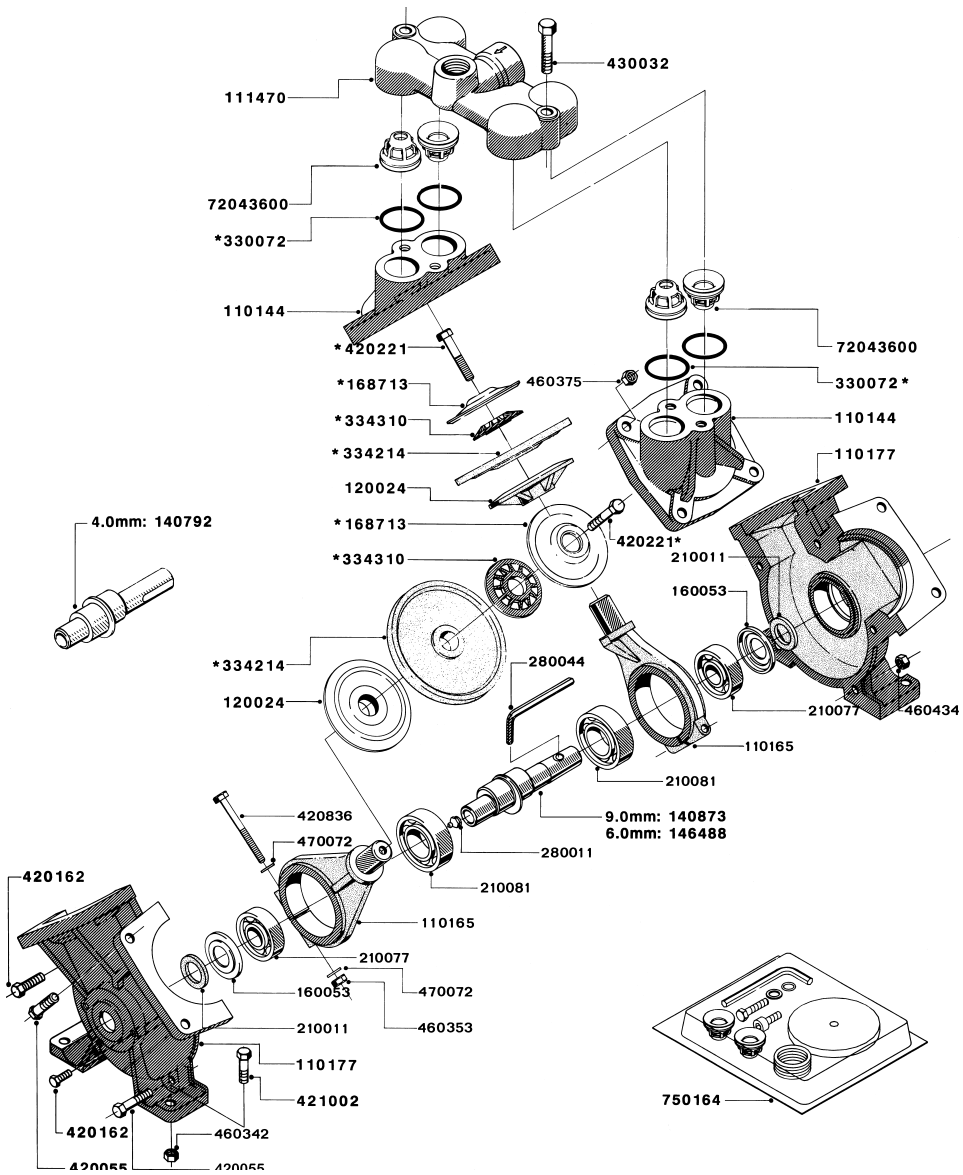
NV





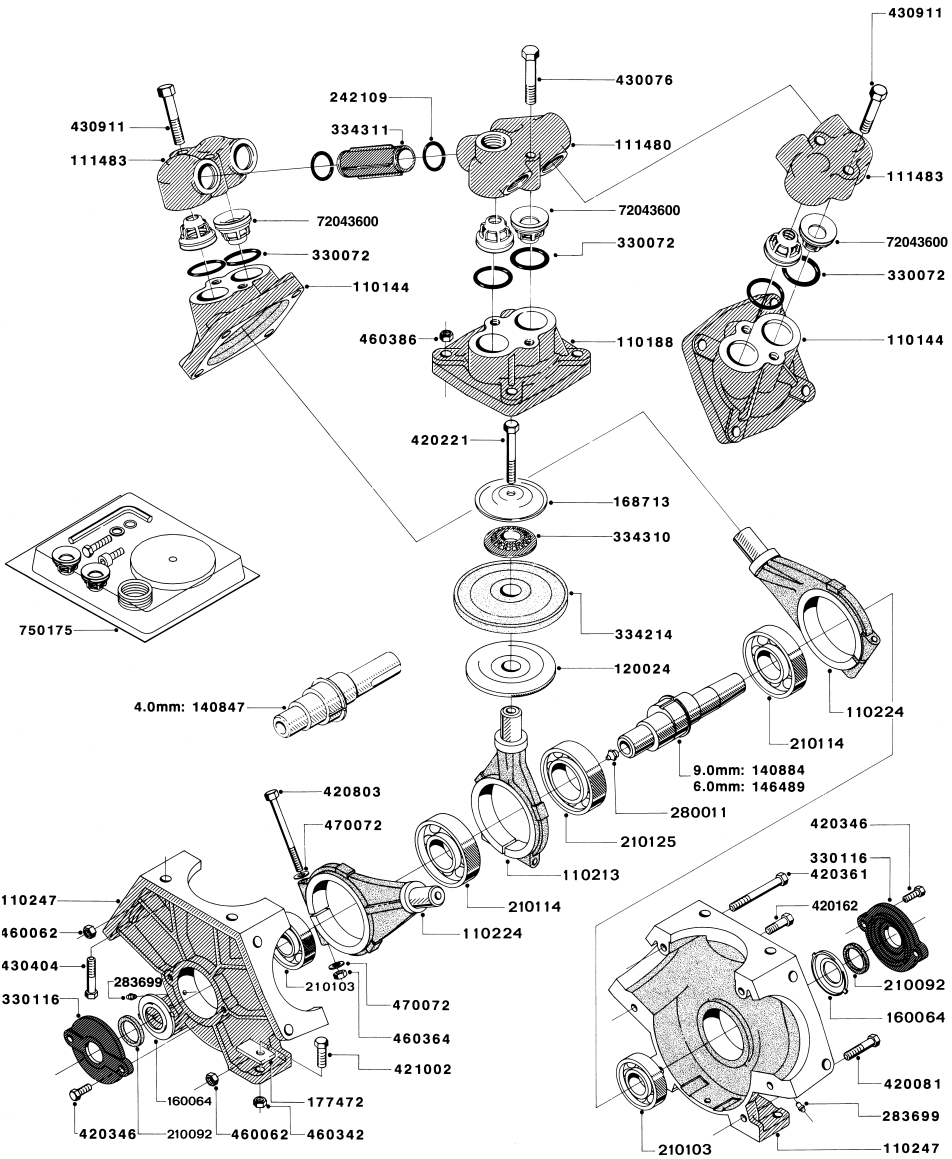
600/foot

A6



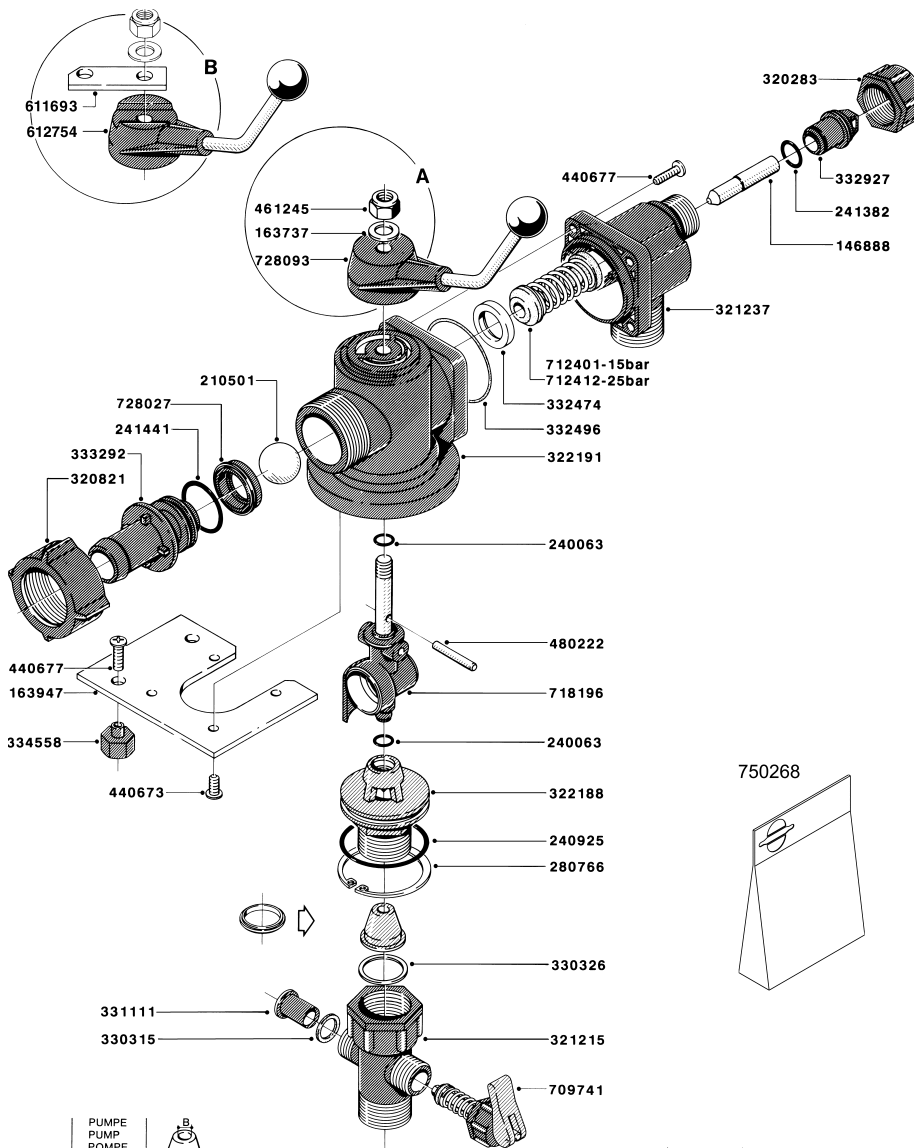
A10



1202/foot



1303/foot

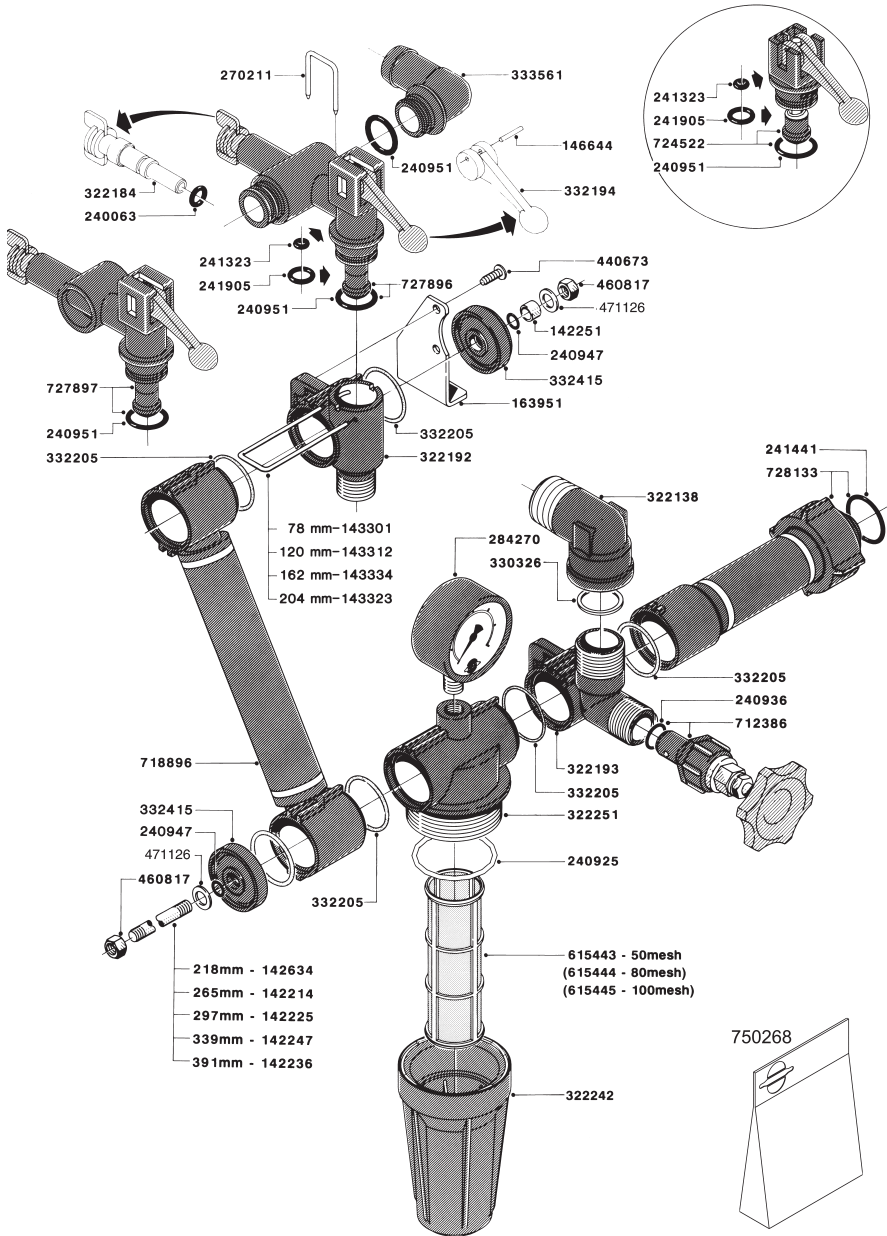
A12



PUMPE									
PUMP		B mm	FARVE	COLOUR	COULEUR	FARBE	COLOR		
POMPE									
BOMBA									
600	333314	5,2	BLÅ	BLUE	BLEU	BLAU	AZUL		
1202	333325	7,3	ROD	RED	ROUGE	ROJO	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		
452									145305

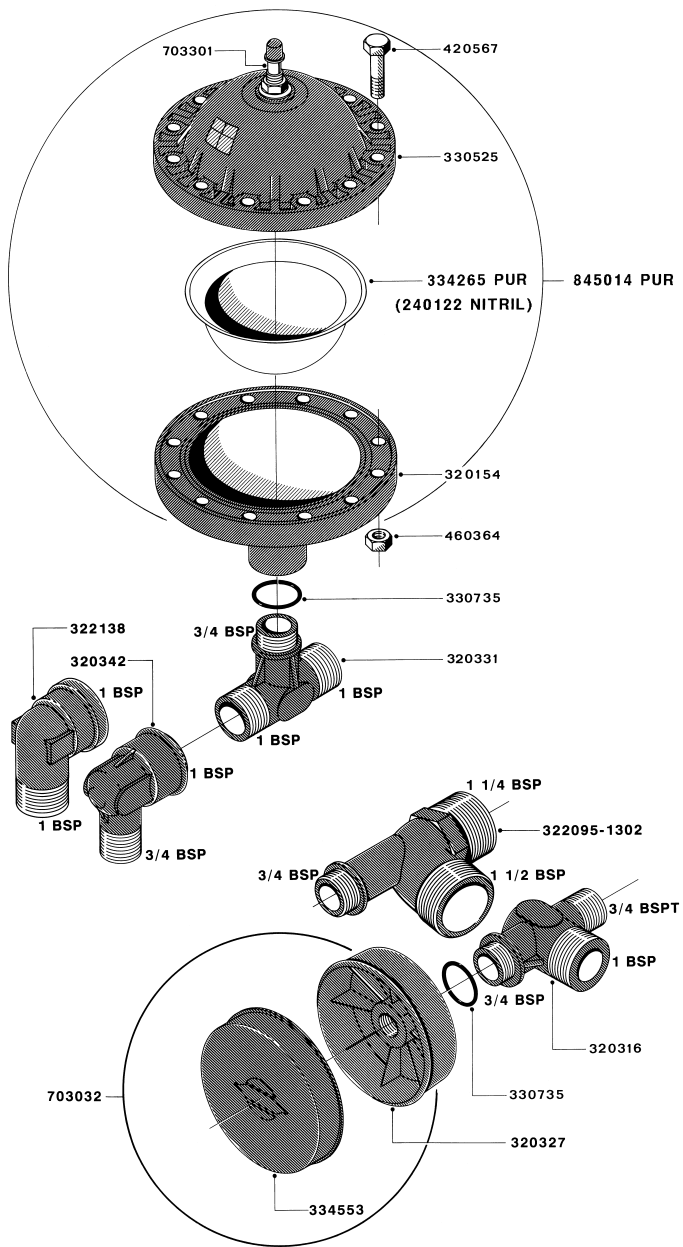
B9

Unit BK 180K (92)



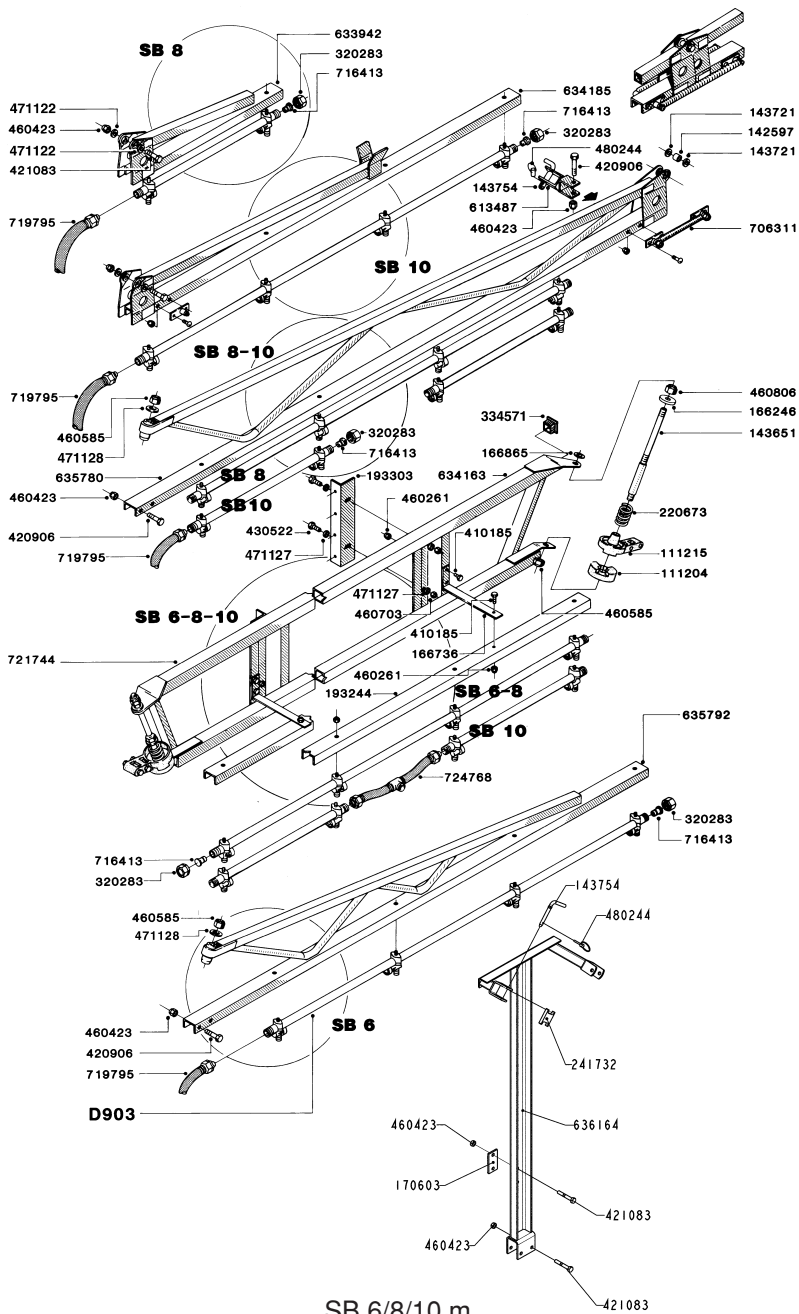
Distributor BK 180K (92)

B13



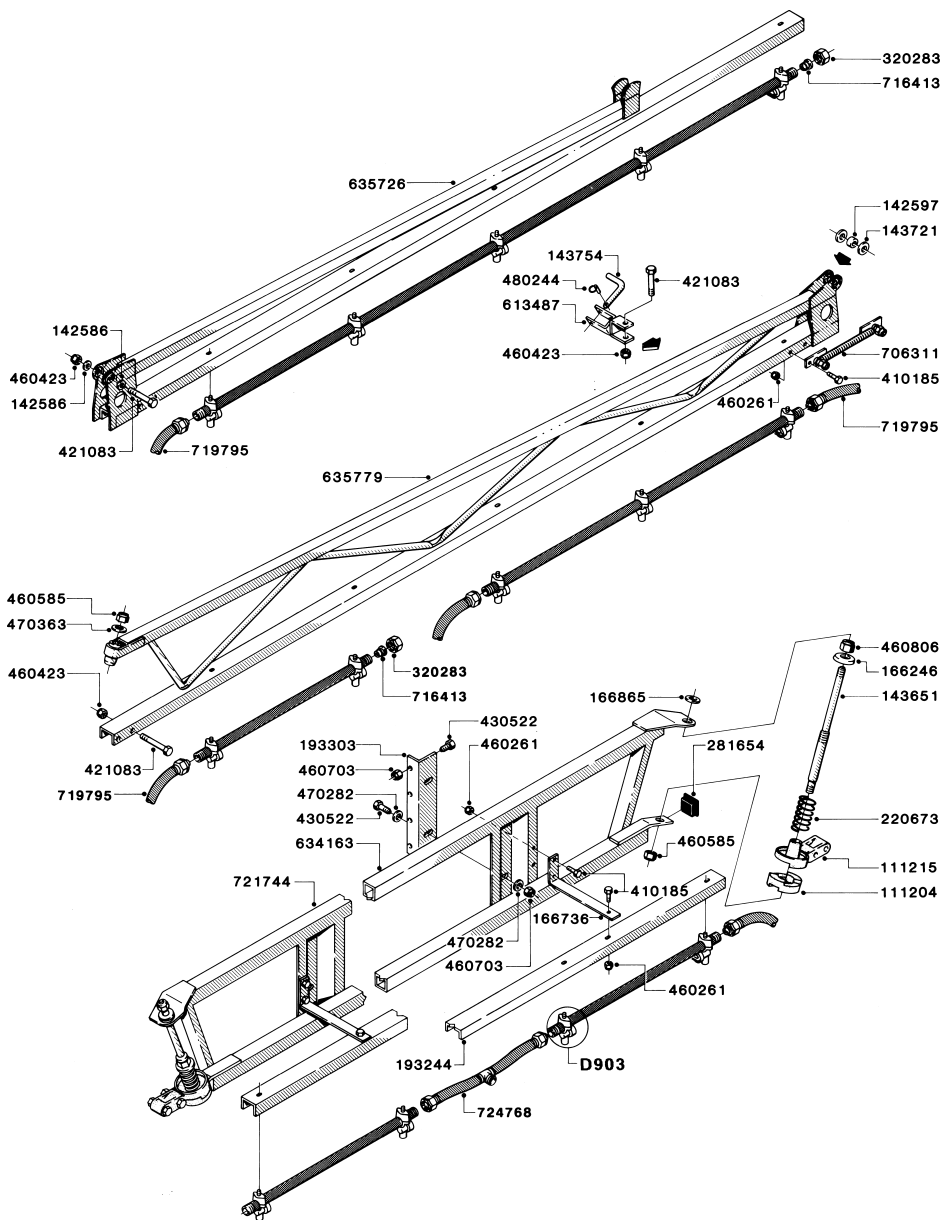
B300

Damper HJ73



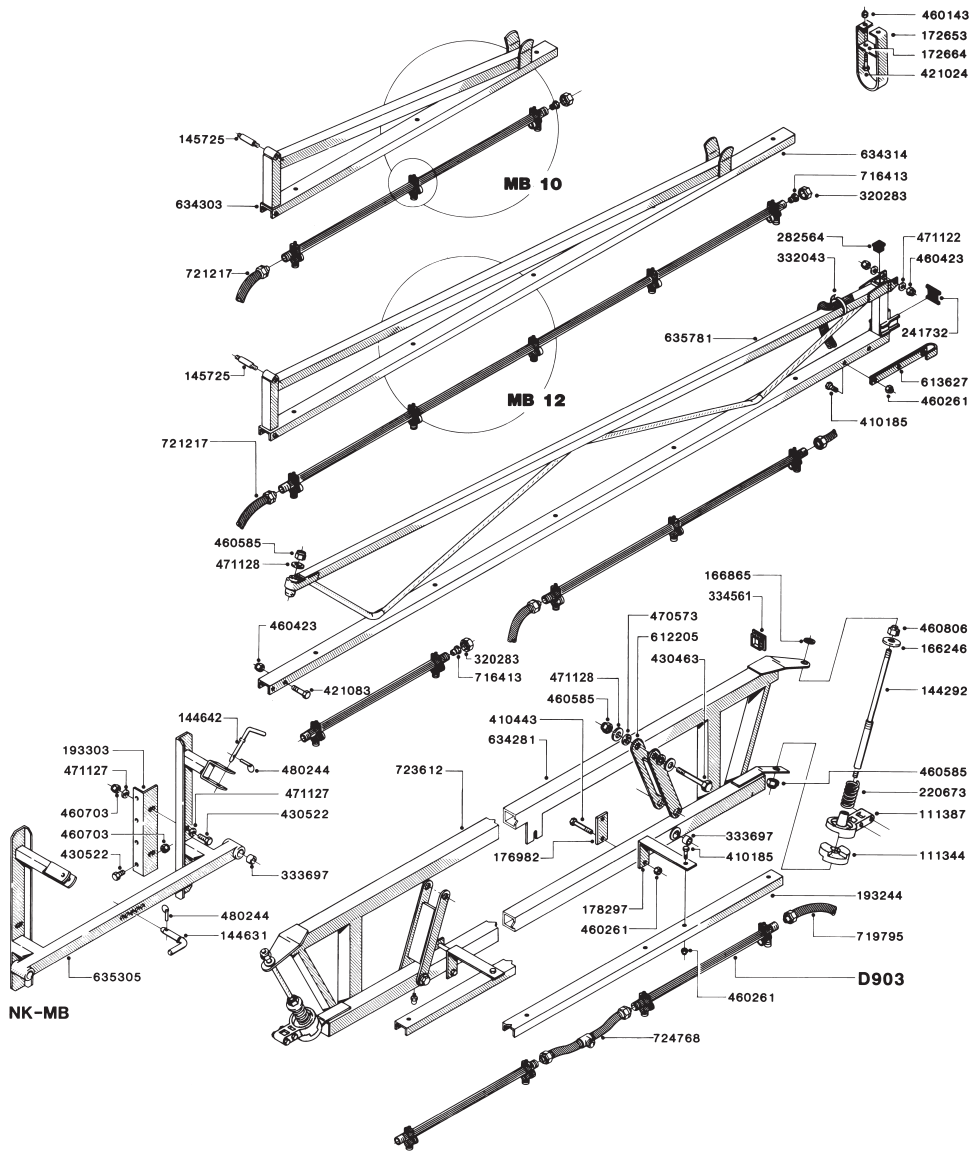
SB 6/8/10 m

D2



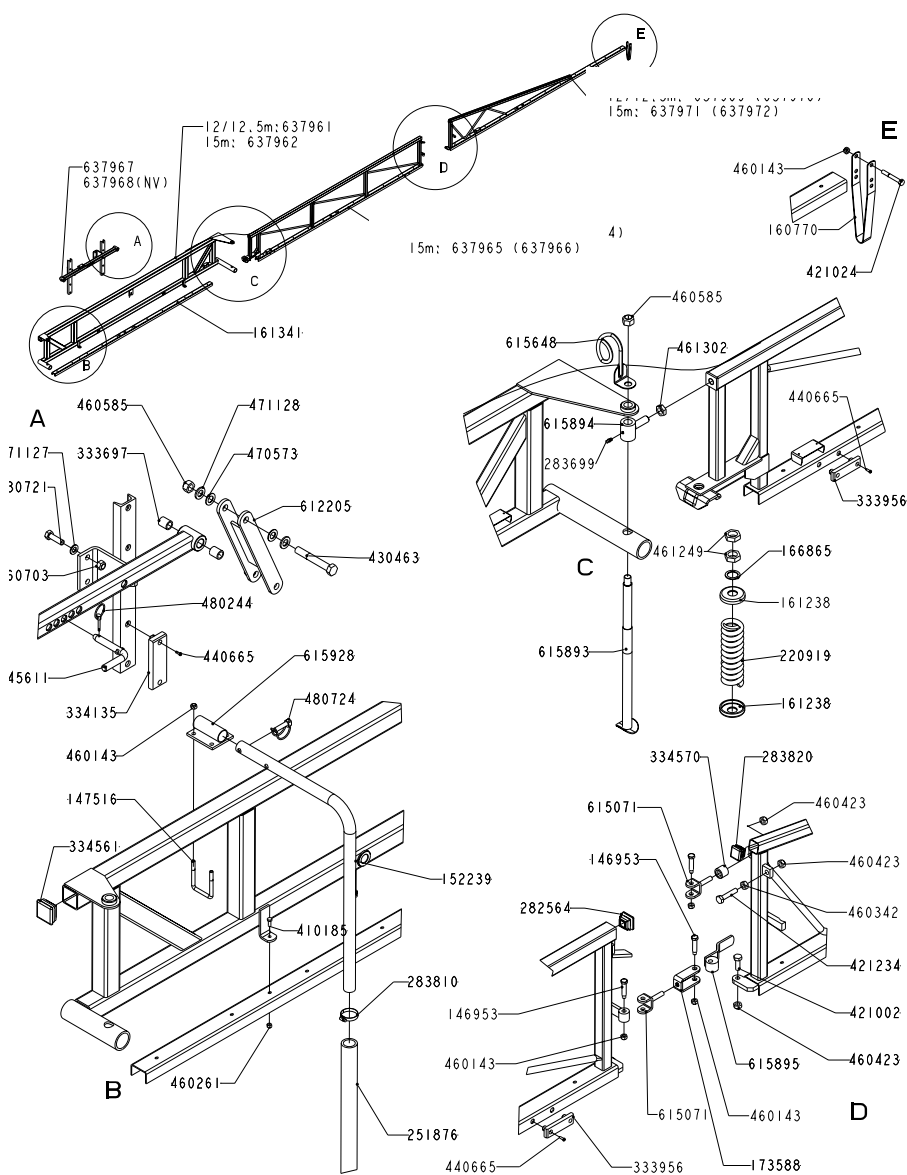
D4

SB 12 m (83)



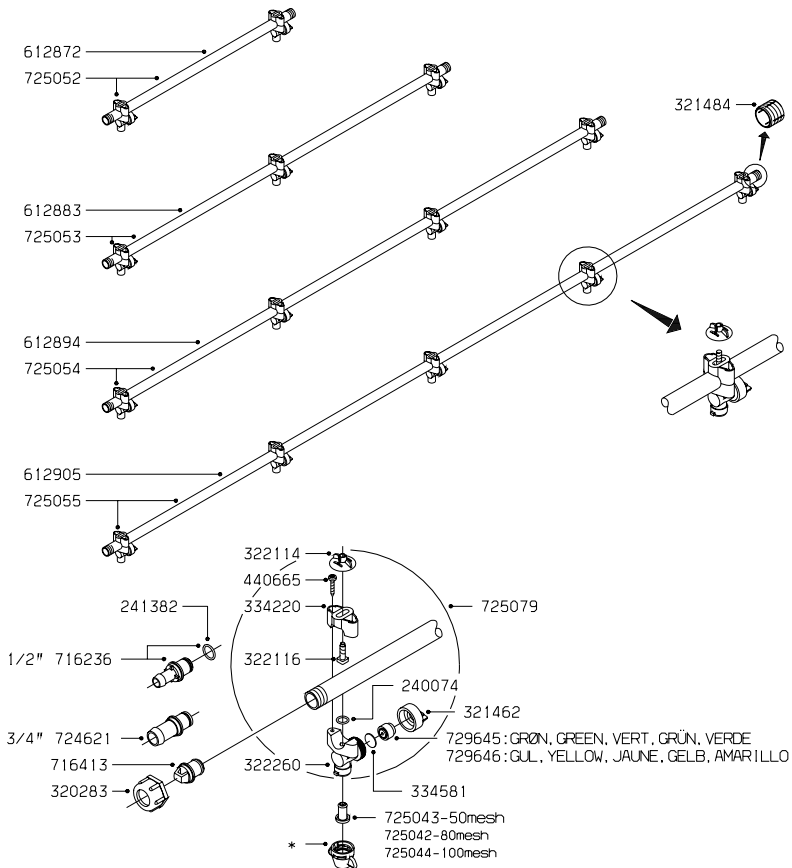
MB 10/12 m

D15



D22

HFM 12/12,5 m

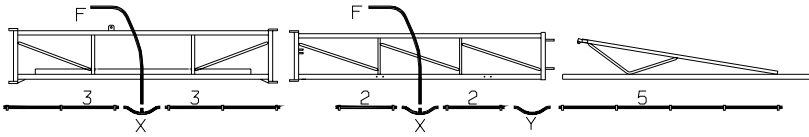


*		FARVE	COLOUR	COULEUR	FARBE	COLOR
371469	S4110-08	VIOLET	VIOLET	VIOLET	VIOLETT	VIOLETA
371470	S4110-10	BRUN	BROWN	BRUN	BRAUN	MARRON
371471	S4110-12	GUL	YELLOW	JAUUNE	GELB	AMARILLO
371472	S4110-14	ORANGE	ORANGE	ORANGE	ORANGE	ANARANJADO
371473	S4110-16	RØD	RED	ROUGE	ROT	ROJO
371474	S4110-18	HVID	WHITE	BLANC	WEISS	BLANCO
371475	S4110-20	GRØN	GREEN	VERT	GRÜN	VERDE
371476	S4110-24	TURKIS	TURQUOISE BLUE	BLEU TURQUOISE	TÜRKLIS	AZUL TURQUI
371477	S4110-30	BLÅ	BLUE	BLEU	BLAU	AZUL
371478	S4110-36	GRÅ	GREY	GRIS	GRAU	GRIS
371479	S4110-44	ELFENBEN	IVORY	IVOIRE	ELFENBEIN	MARFIL

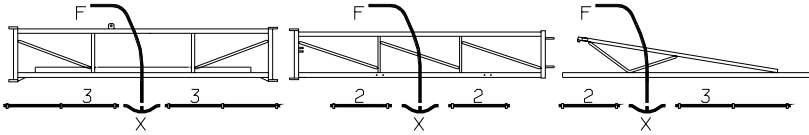
Boom tube SNAP-FIT

D903

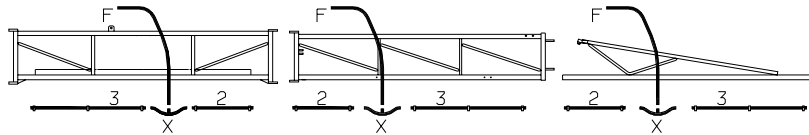
HFM 12M 3 SECTIONS



HFM 12M 5 SECTIONS



HFM 12.5M



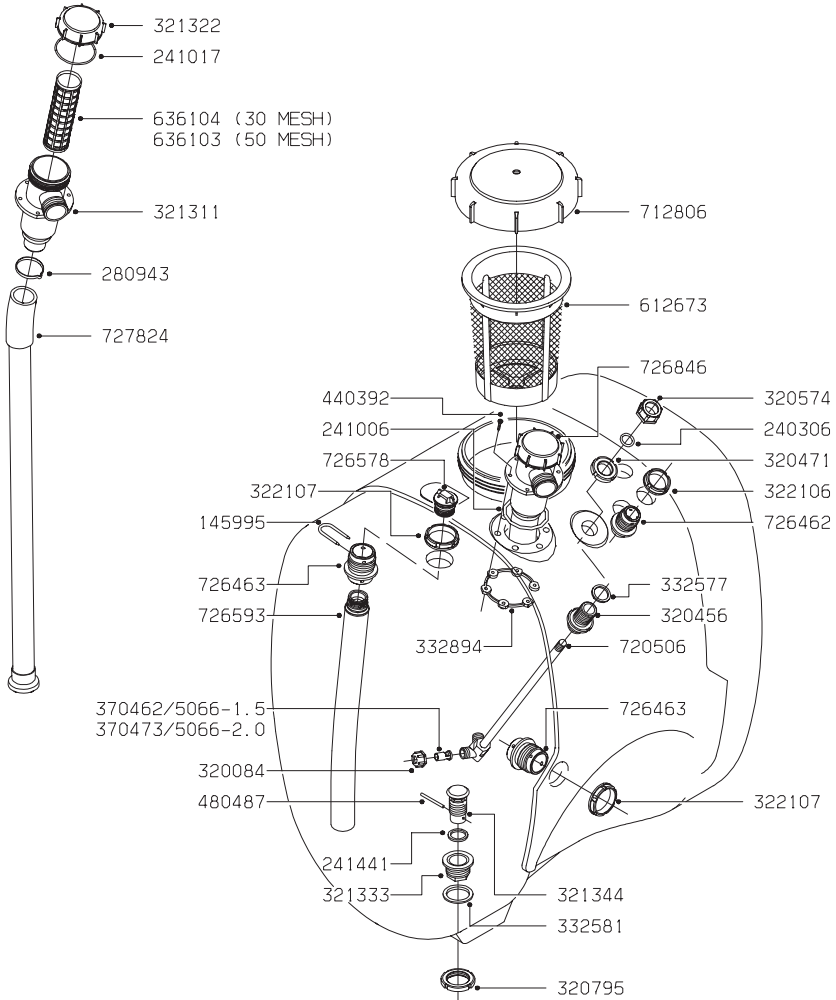
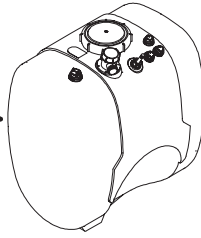
	Ø"	Lmm	Nr.
X	1/2	145+210	727721
Y	1/2	750	719795

	Lmm	Nr.
MA	3800	728797
600/800	5300	724606
BK3	6000	727854
MA	3800	728797
1000/1200	6300	729514
BK3	6700	724607
MA-BK5	5700	716317
	6300	729514
	8500	725456
NV	3000	716225
	5500	725427
	8200	729698

D916

HFM 12/12,5 m

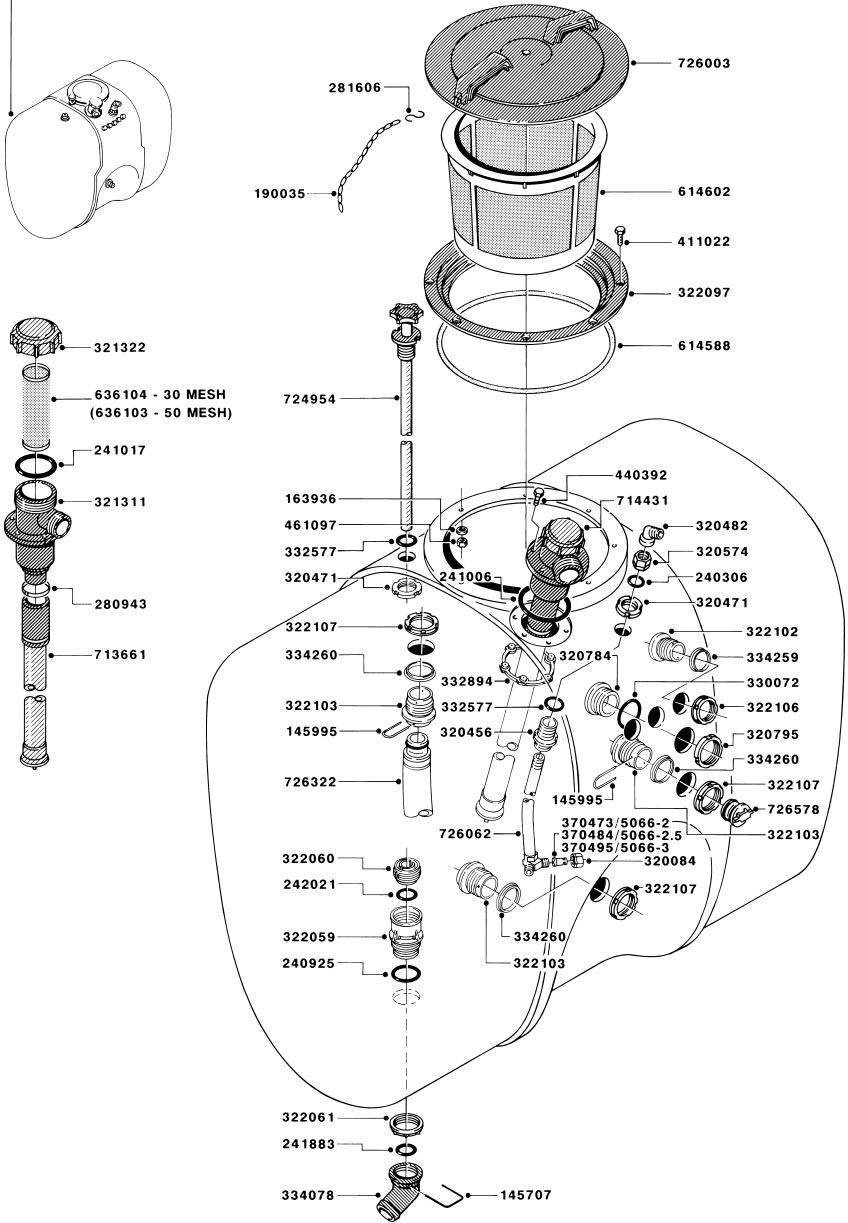
NK300 - 726872
 NK400 - 726866



NK 300/400

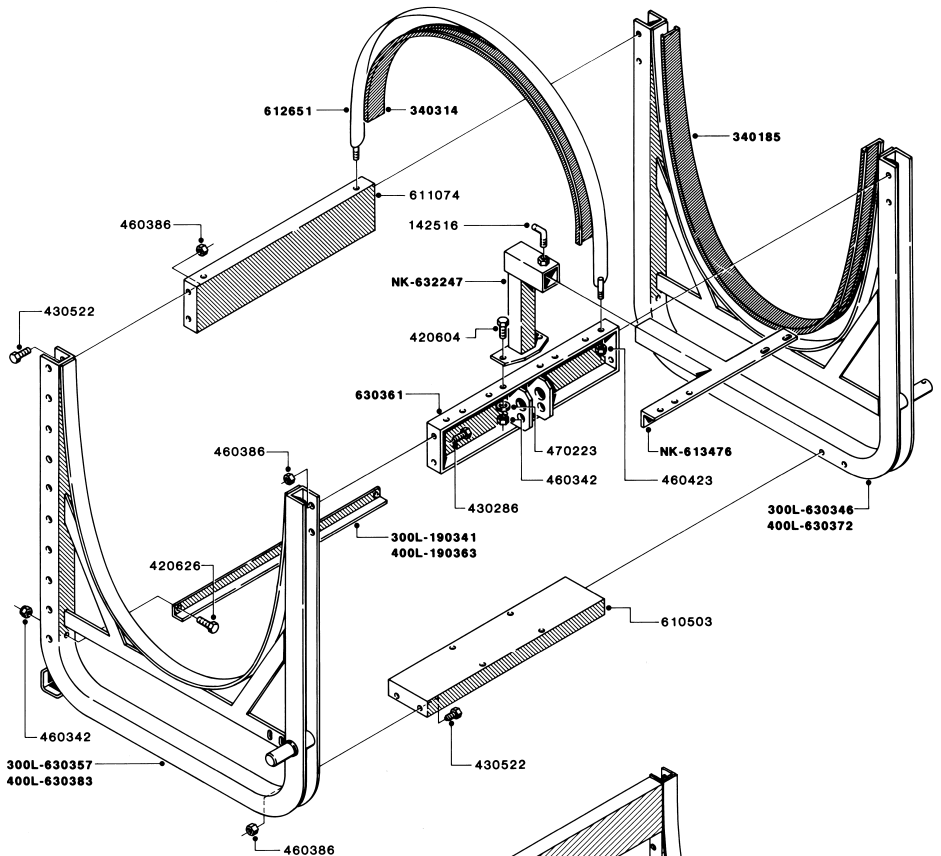
E5

FØR, BEFORE, AVANT, VOR, ANTES 1.8.88 - 713027
 EFTER, AFTER, APRES, NACH, DESPUES 1.8.88 - 725914

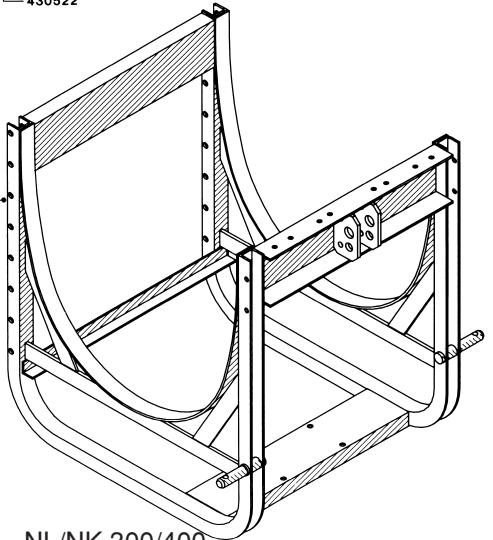


NK/LX 600

E7

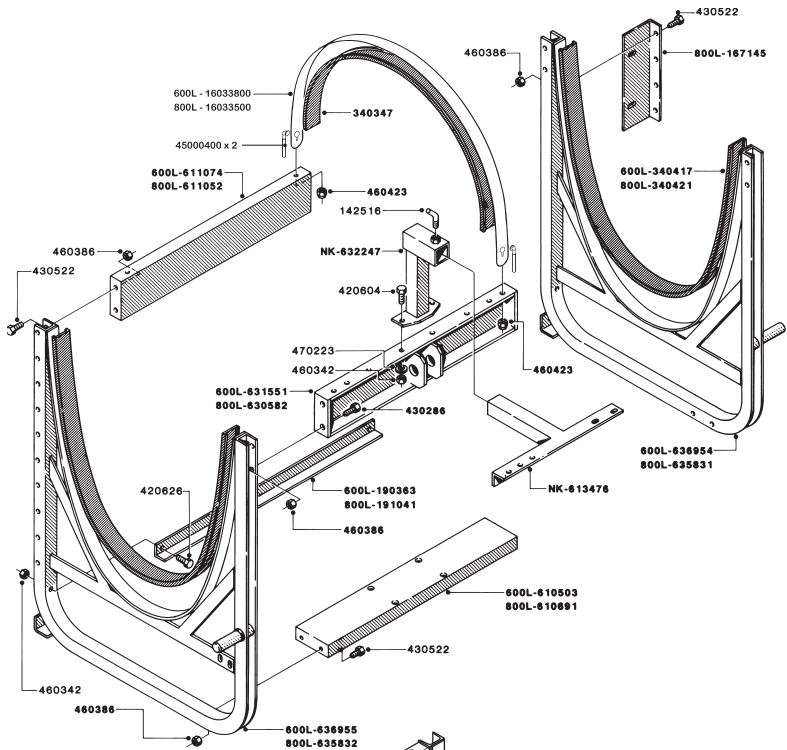


EFTER, AFTER, APRES, NACH, DESPUES: 01.08.93
 300L: 637351
 400L: 637352

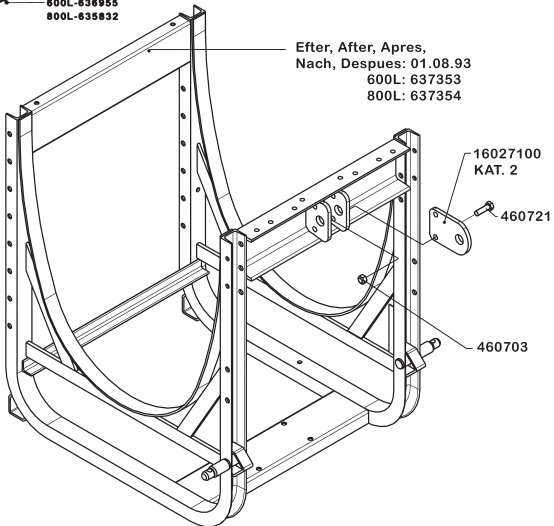


E102

NL/NK 300/400



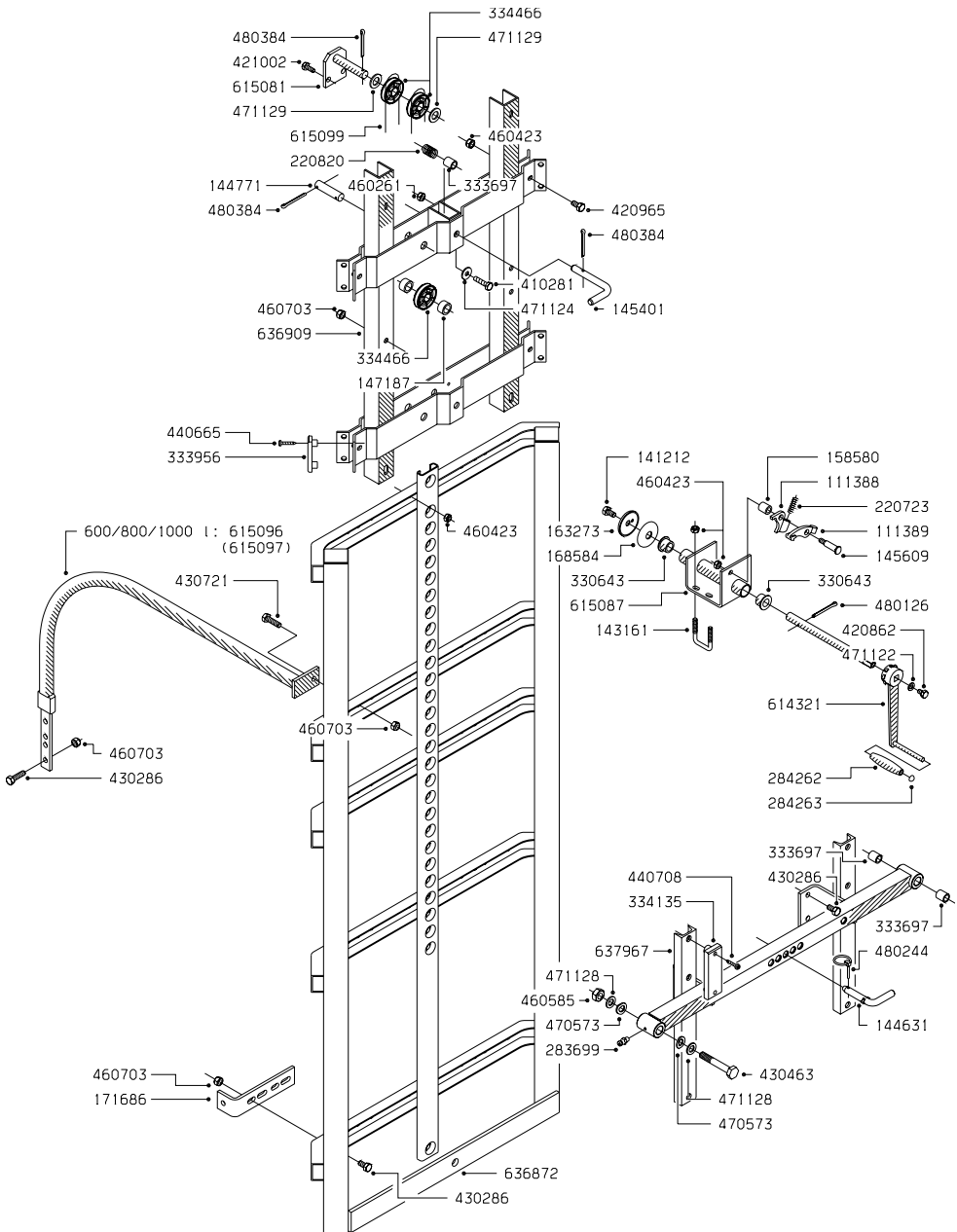
Efter, After, Apres,
 Nach, Despues: 01.08.93
 600L: 637353
 800L: 637354



20.09.2000

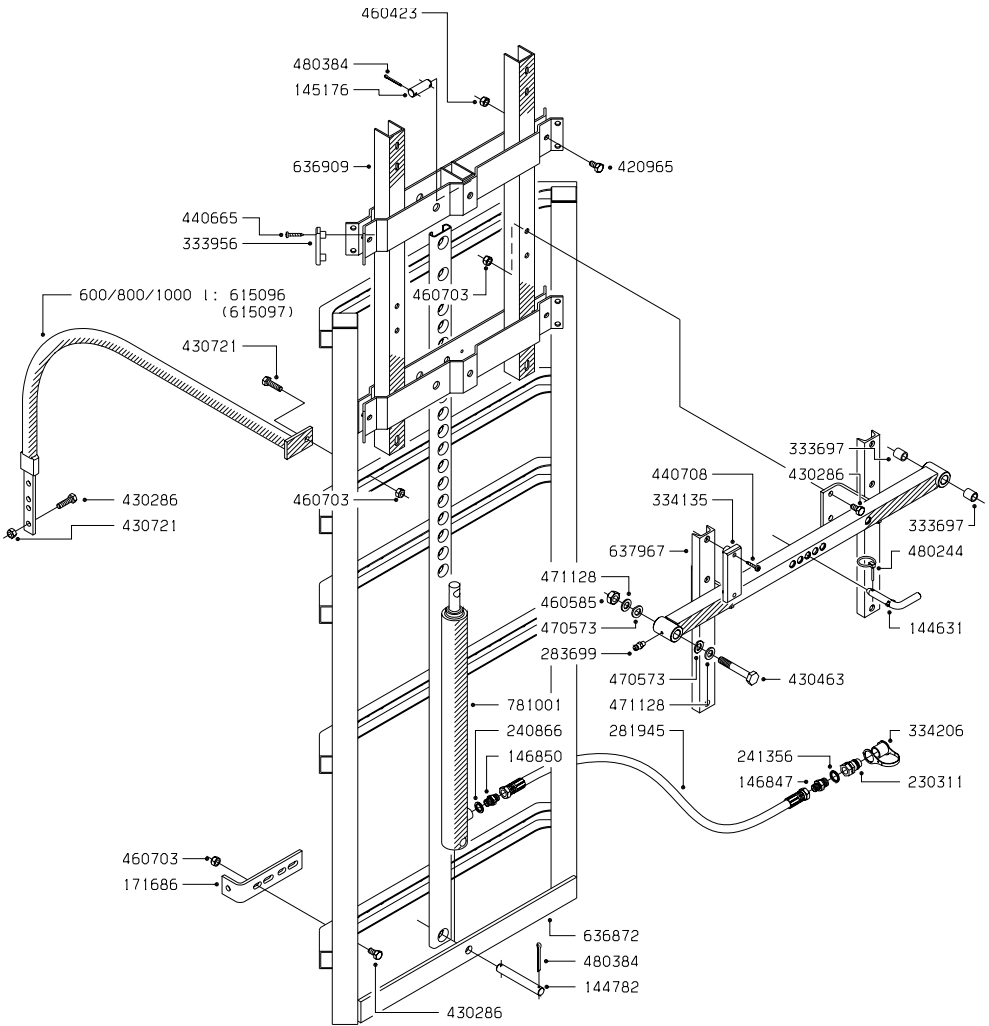
NL/NK 600/800

E103



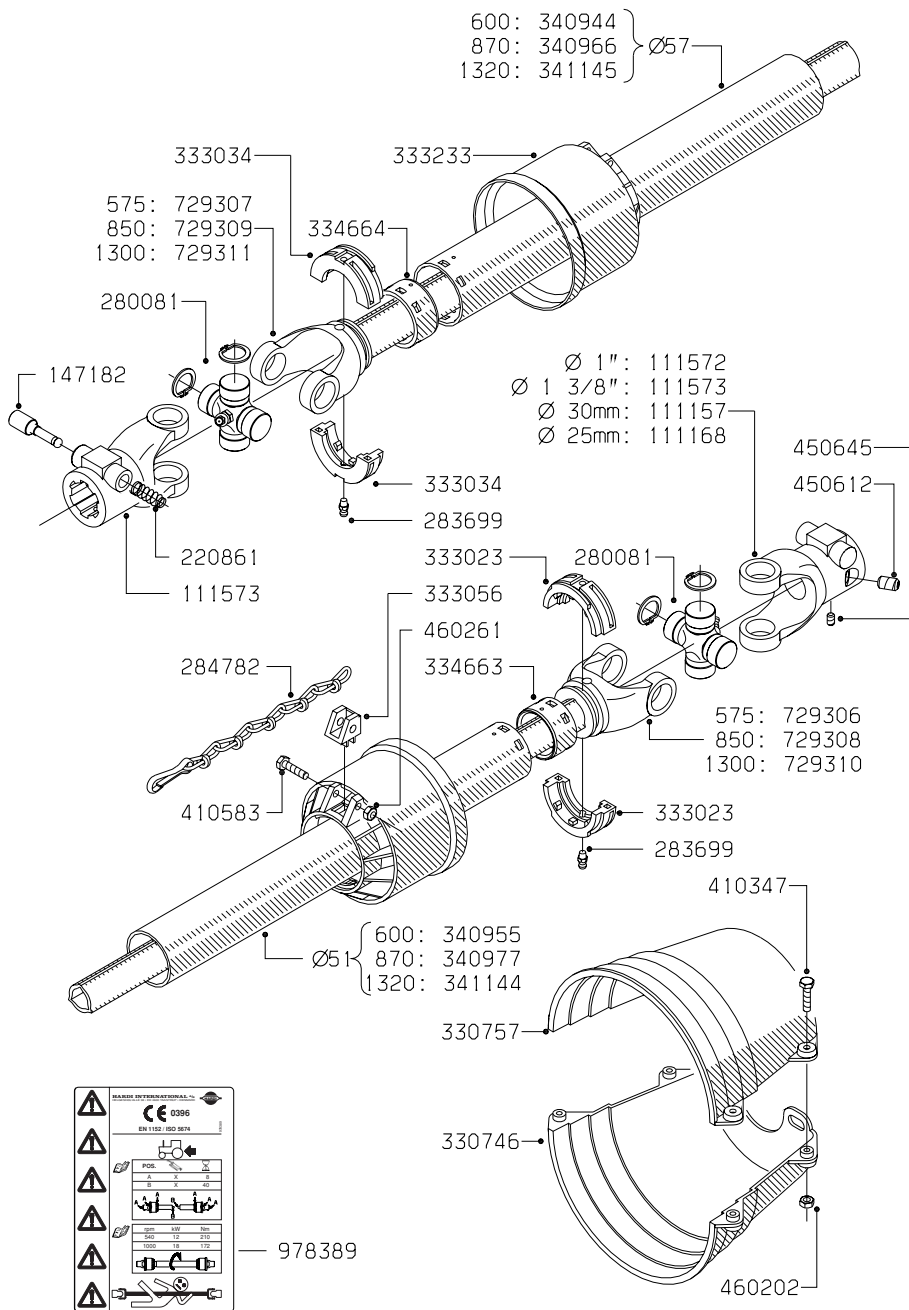
K237

Mechanical boom lift



Hydraulic boom lift

K238



BARBER INTERNATIONAL, INC. CE 0396 EN 1102 / ISO 5074	
	PN: 5, 10, 16, 20
	T: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z
	Kv: 100, 150, 210
	W: 18, 210

Notes:





Notes: