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KS/TR/PU/UN/
SR/GN/CT

Instruction book

674295-GB-99/6



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 15.3.98

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 the instruction book before using the equipment. It is equally important that other operators of this equipment read and understand the 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 the 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 KS, TR, PU, UN, SAFARI (SR), GEMINI (GN) and COLT (CT) 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.



Description

HARDI sprayers are for the application of plant protection chemicals. They consist of electric or petrol driven pump, operating unit, frame with fixed track width (KS/TR/SR/GN) or frame (PU/CT) with or without adjusting brackets and polyethylene tank.

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.

If a pressure up to 40 bar is required, the P3L piston pump is the fitted.

The tank, made of impact-proof and chemical resistant polyethylene, has a purposeful design with no sharp corners, for easy cleaning.

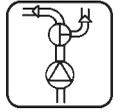
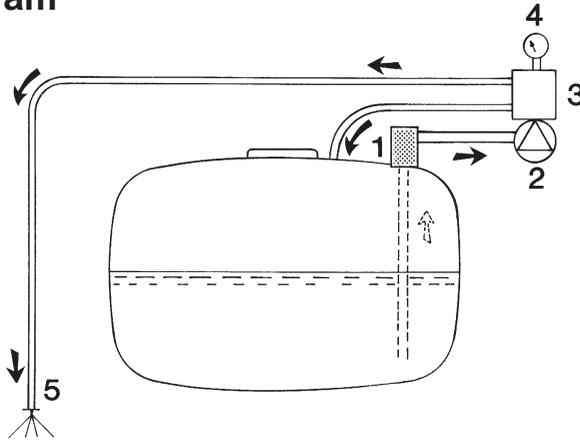
The M-600/600HT, N-2 or BK operating unit consists of; main ON/OFF valve, pressure gauge, distribution valves and pressure control valve.

Identification plates

An identification plate fitted on the frame and pump is to indicate model, year of production with 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

1. Suction filter
2. Pump
3. Operating unit
4. Pressure gauge
5. Spray lance/boom



Before operation

Electric motor

If the sprayer is equipped with an electric motor it must be connected by the authorized electrician according to the local law. Adhere to the law.



Petrol engine

If the sprayer is equipped with a petrol engine, see enclosed instruction manual on the engine regarding petrol, oil change and maintenance. If any doubt, contact Briggs & Stratton service personnel.

WARNING: To prevent accidents remove the high tension lead from the engine before servicing the engine or other parts of the sprayer.



WARNING: REMEMBER SUFFICIENT VENTILATION - NEVER WORK IN CLOSED ROOMS.

Exhaust gas containing carbon monoxide has no odour but is very dangerous.



WARNING: NEVER FILL ON PETROL WHEN THE ENGINE IS WORKING.

Do not spill petrol on a hot engine. This may cause an explosion and serious injury.



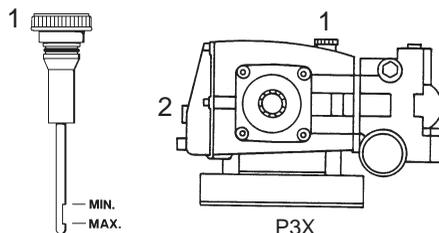


Pump

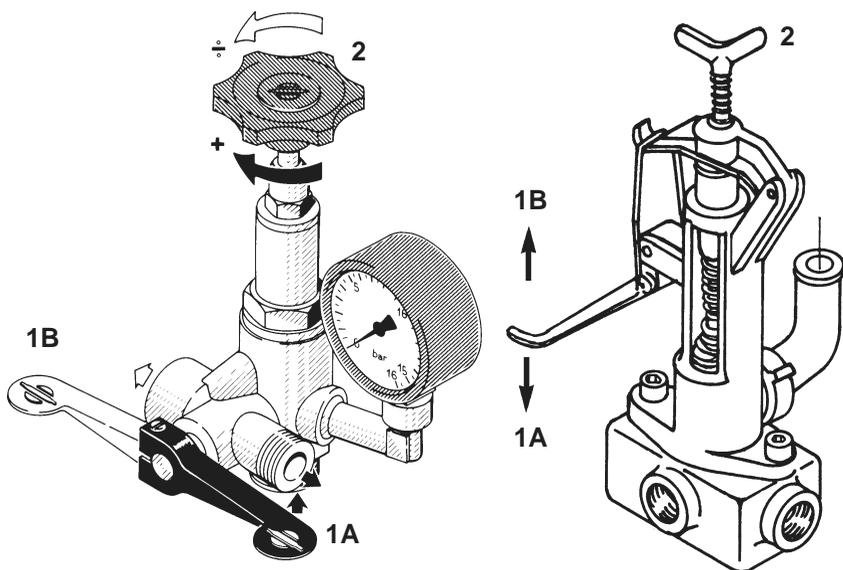
Check the pump belts are tight and the protection screen is in good condition according to local law.

Is the pump the piston type check oil level and fill on SAE 20/40 HD if necessary.

The oil level must be between min. and max. mark on the dip stick (2). Furthermore, the P3L has an outside sight glass (2).



Adjustment of the M600/N 2 controls

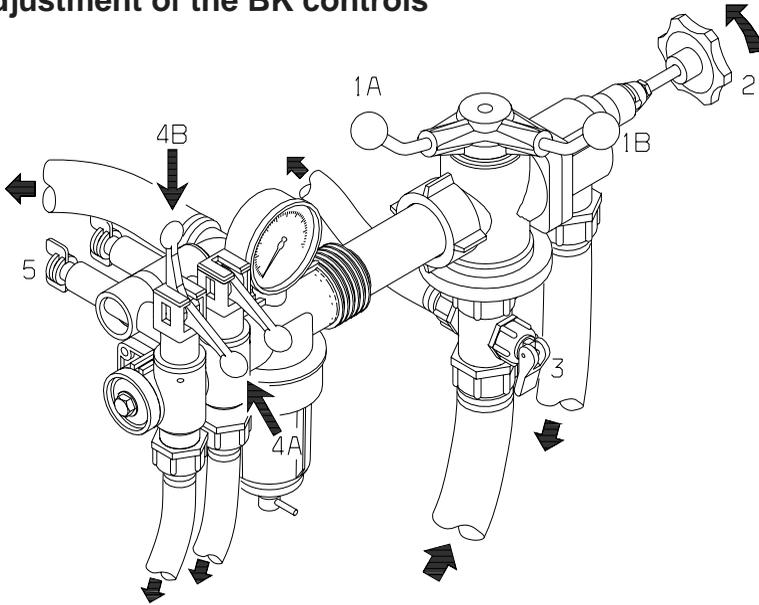


1. Fill the sprayer tank with clean water.
2. Start the engine.
3. Turn main ON/OFF handle to spraying position 1A.
4. The pressure regulating valve 2 is set at the wanted pressure and shown on the pressure gauge.
5. Open for the spray lance and set the pressure at 3 bar more than normal working pressure to check possible leaks. Reduce the pressure to normal working pressure.

6. To stop liquid flow to the spray lance turn main ON/OFF to pos. **1B**, then there will be no pressure in the sprayer and the capacity of the whole pump is led through the by-pass to the tank.

NOTE: Higher working pressure means smaller drops = better coverage, but increased risk of wind drift.

Adjustment of the BK controls



1. Fill the sprayer tank with clean water.
2. Start the engine.
3. Turn main ON/OFF handle to spraying position **1A**.
4. Open the pressure agitation valve **3**, if supplied (tight spring tension).
5. Open the distribution valves **4A**.
6. Set the pressure control valve **2** at 3 bar more than normal working pressure to check possible leaks. Reduce the pressure to normal working pressure.
7. Close the distribution valves **4B** one by one. Adjust on pressure equalization valves **5** if the pressure increases/drops.
8. Turn main ON/OFF and the capacity of the whole pump is led through the by-pass to the tank.





NOTE: Higher working pressure means smaller drops = better coverage, but increased risk of wind drift.

Choice of nozzle size

If you want to change the standard nozzles of the spray lance by other nozzles, it is very important that the pump is capable to feed the nozzles wanted.

Spray Technique - see separate book.



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 agent, etc. Read the detergent and deactivating agent labels. If cleaning procedures are given follow them closely.

Be familiar with local legislation regarding disposal of pesticide 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 cannot be damaged by pesticides
 and their solvents.

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. Check it regularly.

The sprayer has a suction filter placed in the top of the tank.

BK Pressure filter

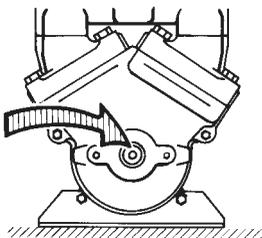
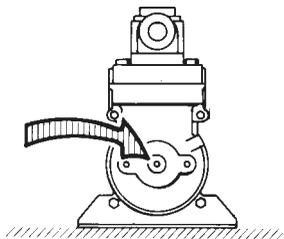
The BK operating unit has an built-in pressure filter. Unscrew the filter bowl to inspect and clean the filter.

Alternative filters are available.

See section on Technical specifications - Filters and nozzles.

Lubrication

After 40 hours' operation the diaphragm pump is lubricated with ball bearing grease Lithium No. 2.





Check the pump belts daily - if tightening is necessary, loosen engine mounts, move the engine and re-tighten.

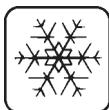
If the engine is equipped with reducing gear please see enclosed Briggs & Stratton instruction manual "Oil check, oil change/intervals and oil qualities".

Lubricate frequently the movable parts of the operating unit with corrosion protective oil.

Change the oil of the piston pump for the first time after 50 hours' operation and then every 150 hours or at least once a year. Fill 20/40 HD oil until it shows in the sight glass.

Be sure there is no play in the wheel bearings - use ball bearing grease twice a year.

Check oil level of the petrol engine each day. Please see "Oil change" Briggs & Stratton instruction book.



Off-season storage

When the spraying season is over you should devote some extra time to the sprayer before it is stored.

Tyres

It is important frequently to check tyre pressure. The tyres should not run under-inflated. This only promotes instability and rapid wear. See section on Technical Specifications.

Hoses

Check that none of the hoses are caught or have sharp bends. A leaky hose can cause 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.

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. The anti-freeze solution also hinders the O-rings and gaskets from drying out.



Relieve the pressure regulating spring.

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.
- Unclean electric components causes poor connections.

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.
6. Keep the electric components clean.





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.
Pressure filters increasing.	Clean all filters. beginning to clog.	
	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

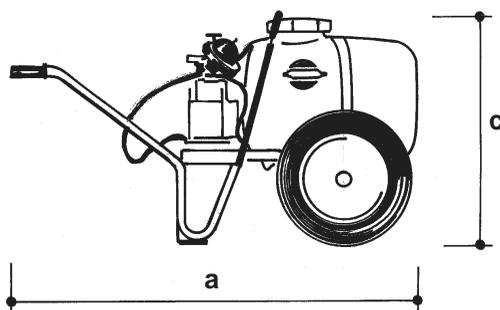
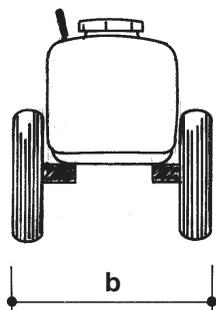
Filters and nozzles

30 mesh suction filter with exchangeable filter screen.

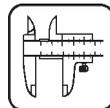
Measure and weight

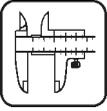
Tyres

No.	Size	Ply rating	Inflation Pressure bar
1	4.80/4.00-8	2 PR	max. 2.0 bar
2	4.00/3.50-12	4 PR	max. 3.8 bar
3	18 x 9.50	4 PR	max. 3.8 bar



Model	Tank size l	Wheel	Measure a x b x c cm	Weight kg
KS-100	100	1	153 x 53 x 79	59
KS-120	120	1	153 x 71 x 81	75
TR-2-200	200	2	184 x 80 x 118	93
TR-2-300	300	2	234 x 80 x 118	98
TR-3-200	200	2	116 x 80 x 118	91
TR-3-300	300	2	166 x 80 x 118	96
PU-200/CT-200	200	-	126 x 58 x 86	59
PU-300/CT-300	300	-	145 x 58 x 86	66
PU-800	800	-	195 x 120 x 98	135
PU-800	800	-	265 x 110 x 120	110
PU-1000	1000	-	265 x 127 x 148	135
PU-1500	1500	-	265 x 127 x 149	150
SR-100	100	3	153 x 102 x 79	60
GN-2-200	200	3	190 x 110 x 92	94
GN-2-300	300	3	240 x 110 x 92	99
GN-3-200	200	3	170 x 110 x 119	92
GN-3-300	300	3	220 x 110 x 119	97





Materials

Tank HDPE

Hoses PVC

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



Cleaning



Function



Lubrication



Warning



Winter storage



Operating



Operational problems



Service/adjustment



Technical specifications



Pressure

Assembly

Preassembly information

The sprayer is supplied ex works in shipping packages.

NOTE: Removal of the plastic bag covering the tank is easiest done before assembly.

Some components are shipped within the tank. Check inside.

To verify connection of hoses, a function diagram is included on the last page.

Packaging information

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

Recycling

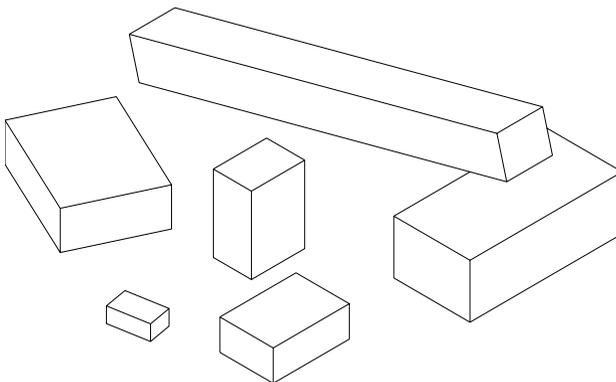
Cardboard: Can recycle up to 99% and therefore should be put into the waste collection system.

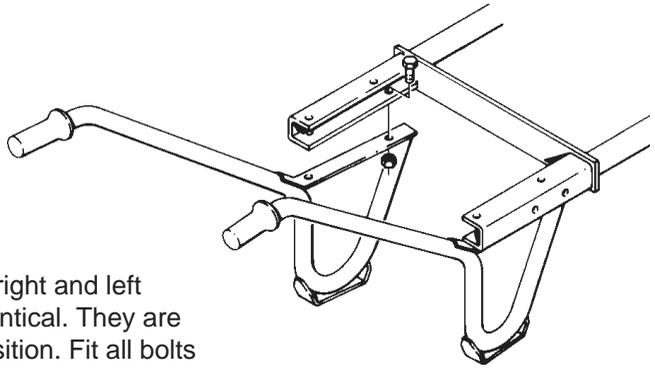
Polystyrene foam: Can be recycled. Fluorocarbons (CFC) not used in foam production.

Polyethylene: Can be recycled.

NOTE: Use O-rings where indicated. Lubricate them with non-mineral lubricant (silicon oil) before assembly. Where O-rings are not indicated, use sealing tape.

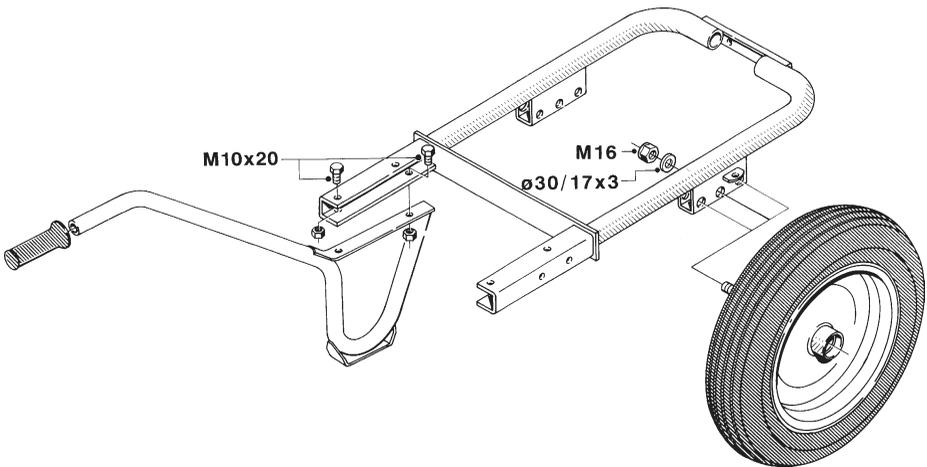
1. Check that all shipping packages are present.





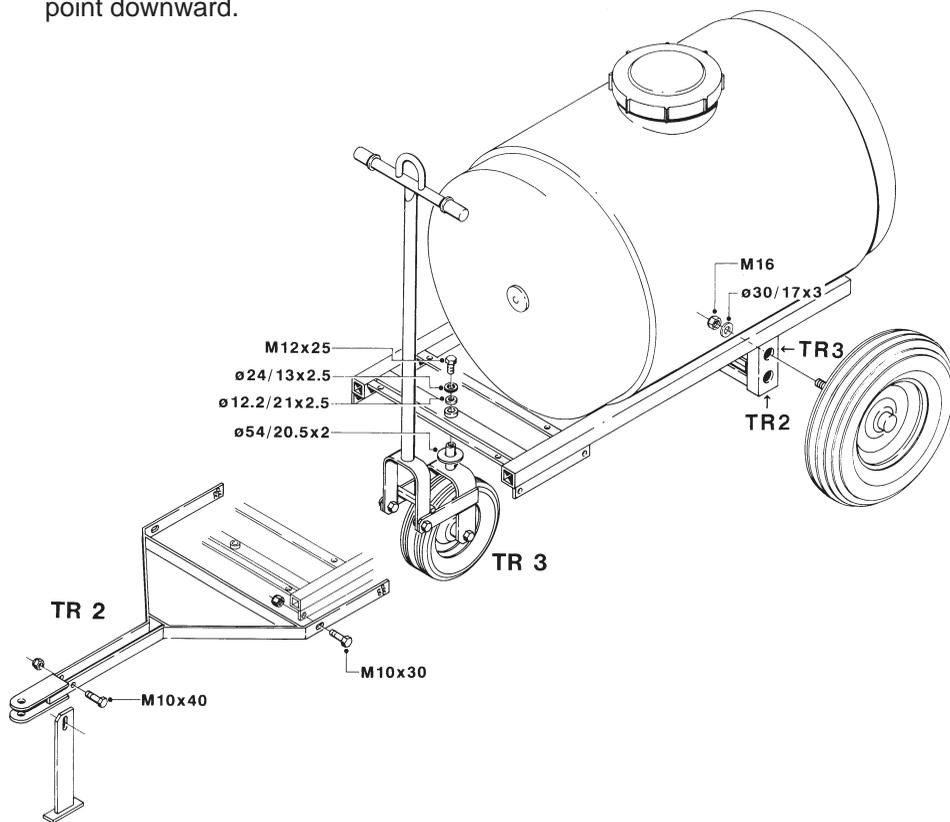
2. Note: On KS 100 right and left handle are not identical. They are fitted in widest position. Fit all bolts in pump unit/tank frame/handle before tightening the bolts.

On KS 120 there are 3 assembly possibilities of wheels depending on how much weight is wanted transferred to the carrying handle.



3. On TR3 use upper hole in tank frame - fit nose wheel.

On TR2 use lower hole in the tank frame. Fit the drawbar on tank frame so that the position of the sprayer is horizontal when attached to the tractor. Parking foot must point downward.



4. Bolt unit on frame (only PU).

Use sealing tape on T-piece, O-ring and suction pulsation damper.

Mount pressure pulsation damper.

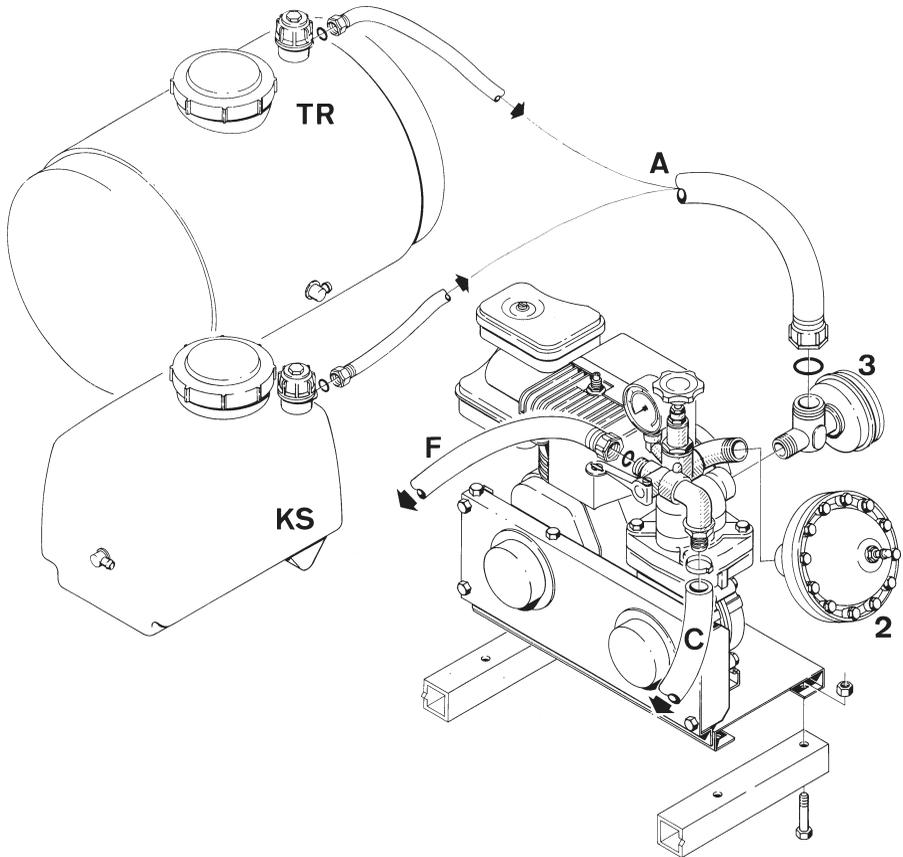
Fit suction hose A - remember O-ring.

Fit return hose C - remember clamps.

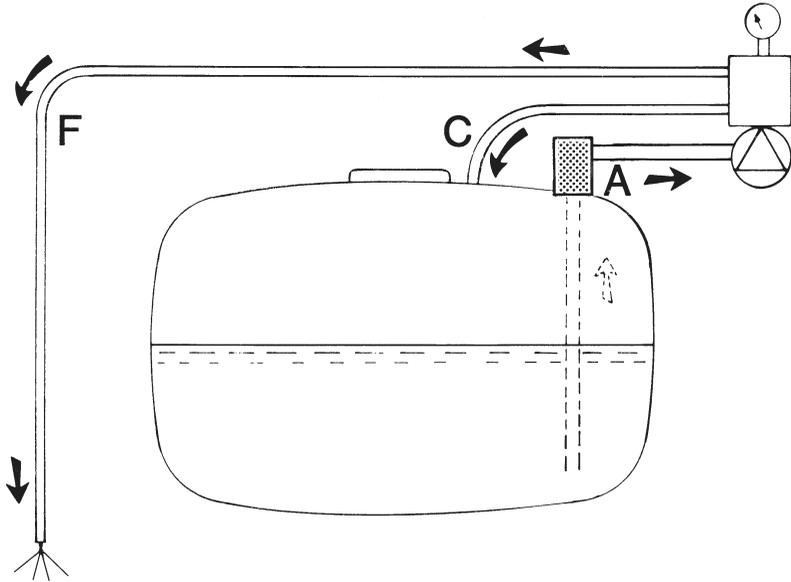
Fit feed hose B (lance/boom) - remember O-ring.

See back of gauge. Remember to pierce casing after installation.

Screw home, but do not overtighten.



5. Check that all hoses are fitted according to the diagram. PRES-
SURE TEST WITH CLEAN WATER - CORRECT POSSIBLE
DEFECTS AND LEAKS.



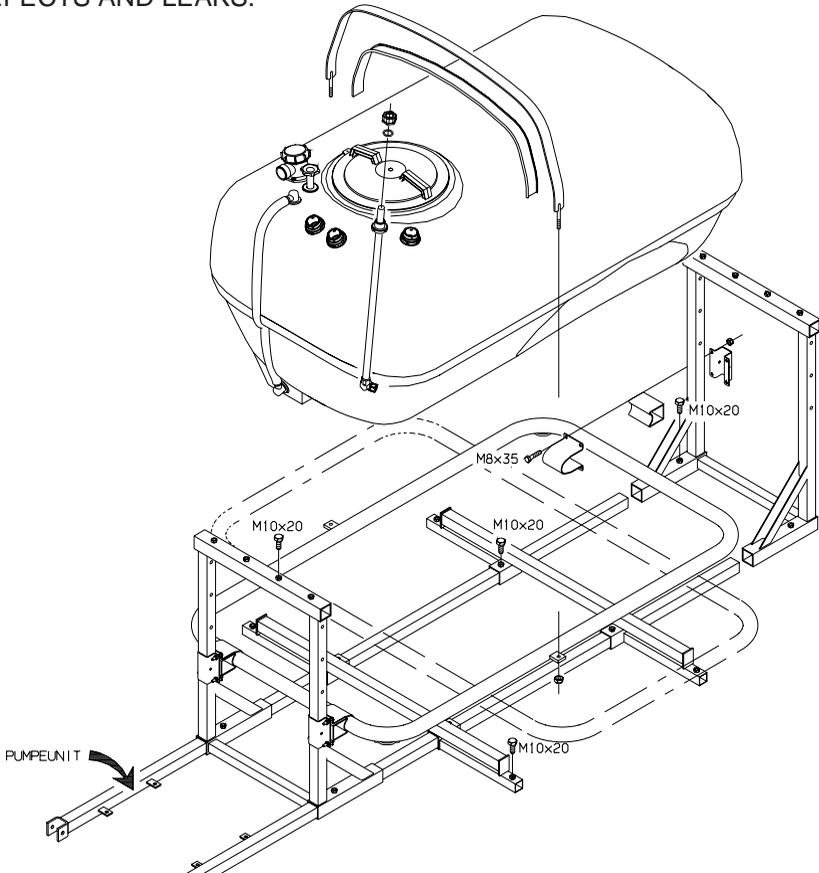
6. PU 800/1000/1500 only

Fit the 2 guides (A) in tank frame. Fix tank frame with bracket/hole profile/bracket (B). Are tightened together by means of M8 x 35. Mount pump unit near fork. See back of gauge - pierce the casing. Fit the gauge but do not overtighten.

Fit hoses - see diagram fig. 1 & 4. Blank off pressure agitation tube by means of a socket (320047 + 330212). The tank frame can be raised and lowered - Mind gravity displacement!

Fit and adjust the 4 side braces (C) so that the tank does not move on the platform.

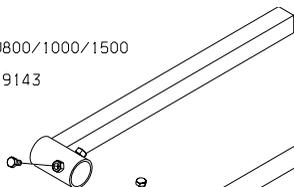
PRESSURE TEST WITH CLEAN WATER - CORRECT POSSIBLE DEFECTS AND LEAKS.



7. Intermediate brackets.

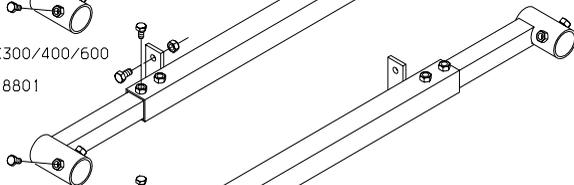
PU800/1000/1500

719143



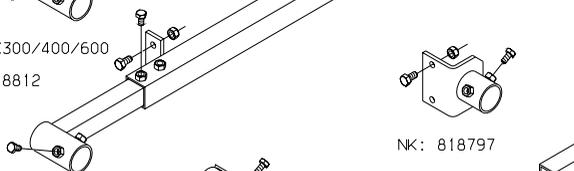
NK300/400/600

818801

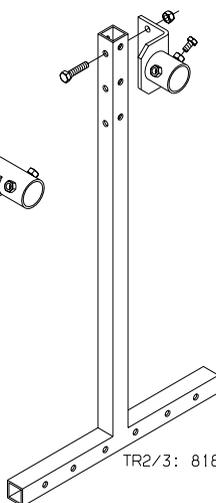
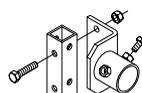


NK300/400/600

818812



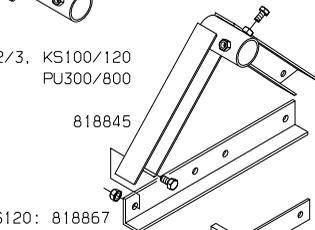
NK: 818797



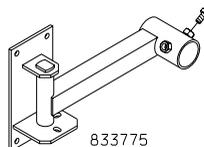
TR2/3: 818224

TR2/3, KS100/120
PU300/800

818845

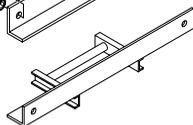


KS120: 818867



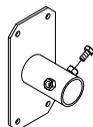
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KS100: 613244

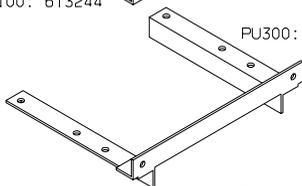


LX/LY/LZ (TY/TZ)

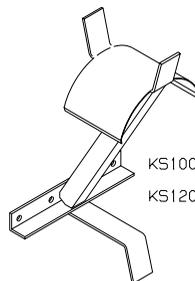
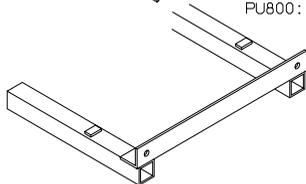
833768



PU300: 613255



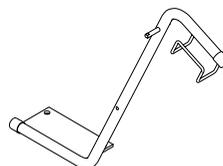
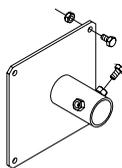
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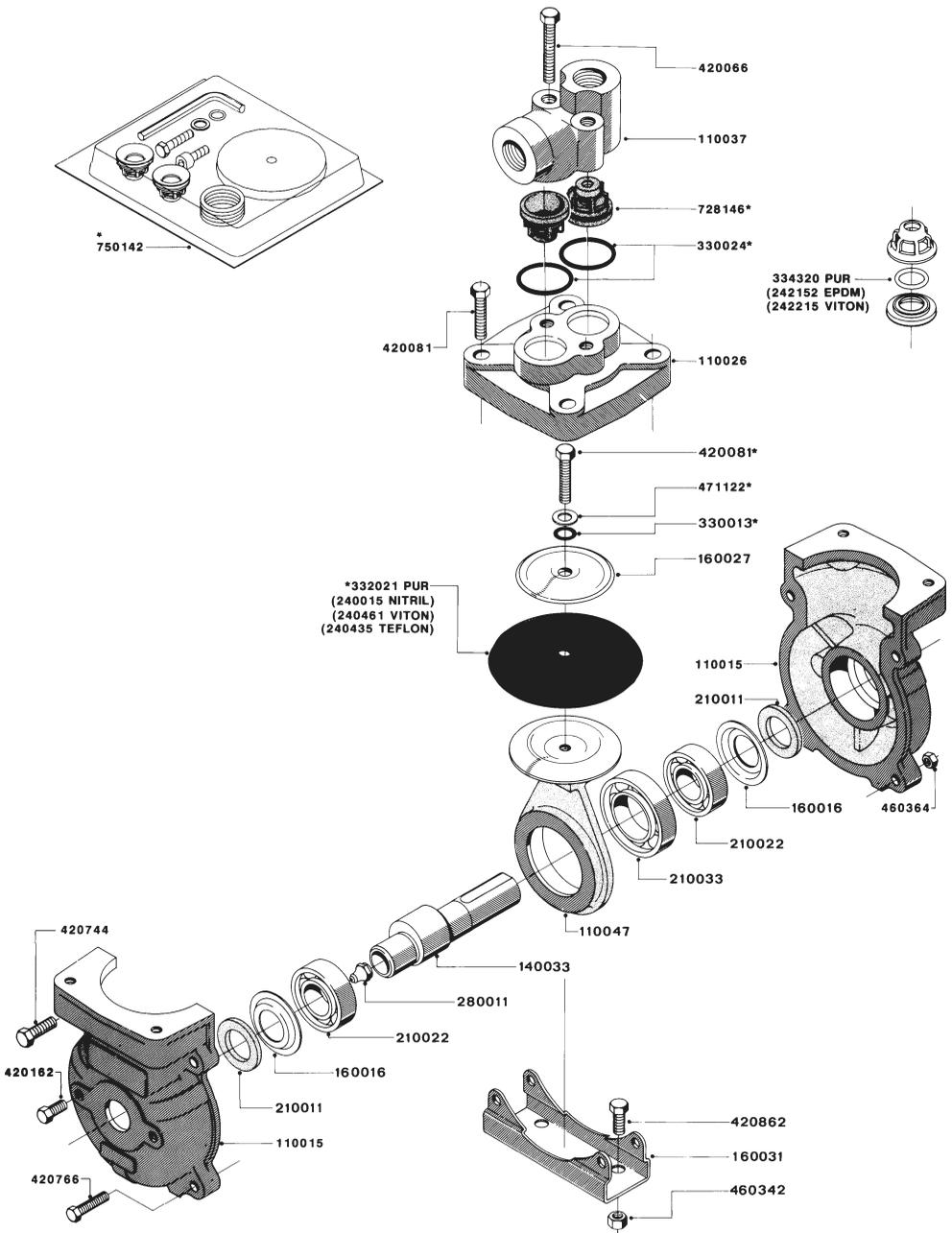
KS100: 845084

KS120: 845106

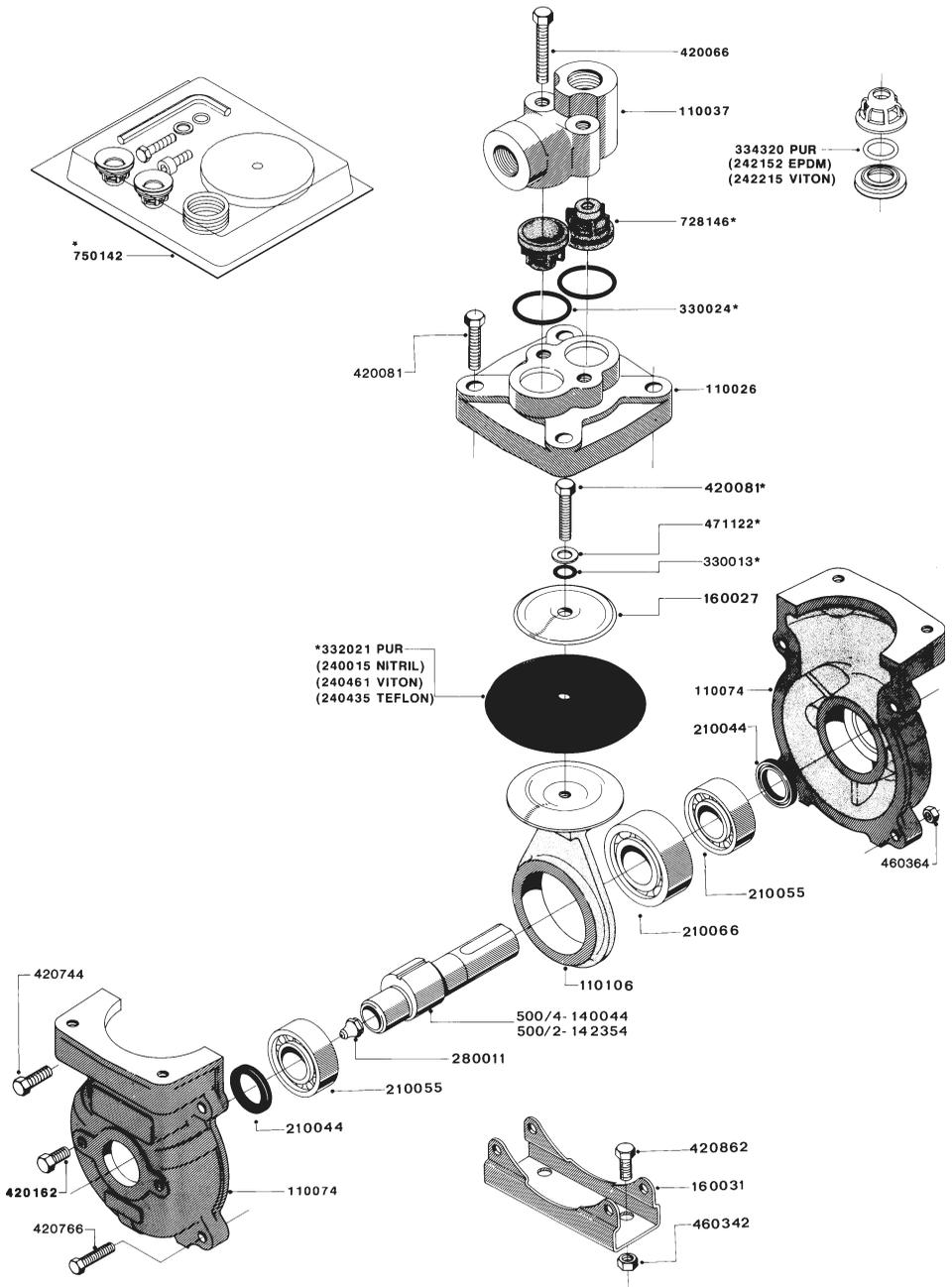
TY/TZ: 818294



KS100/120,
PU200/300-60L: 725619

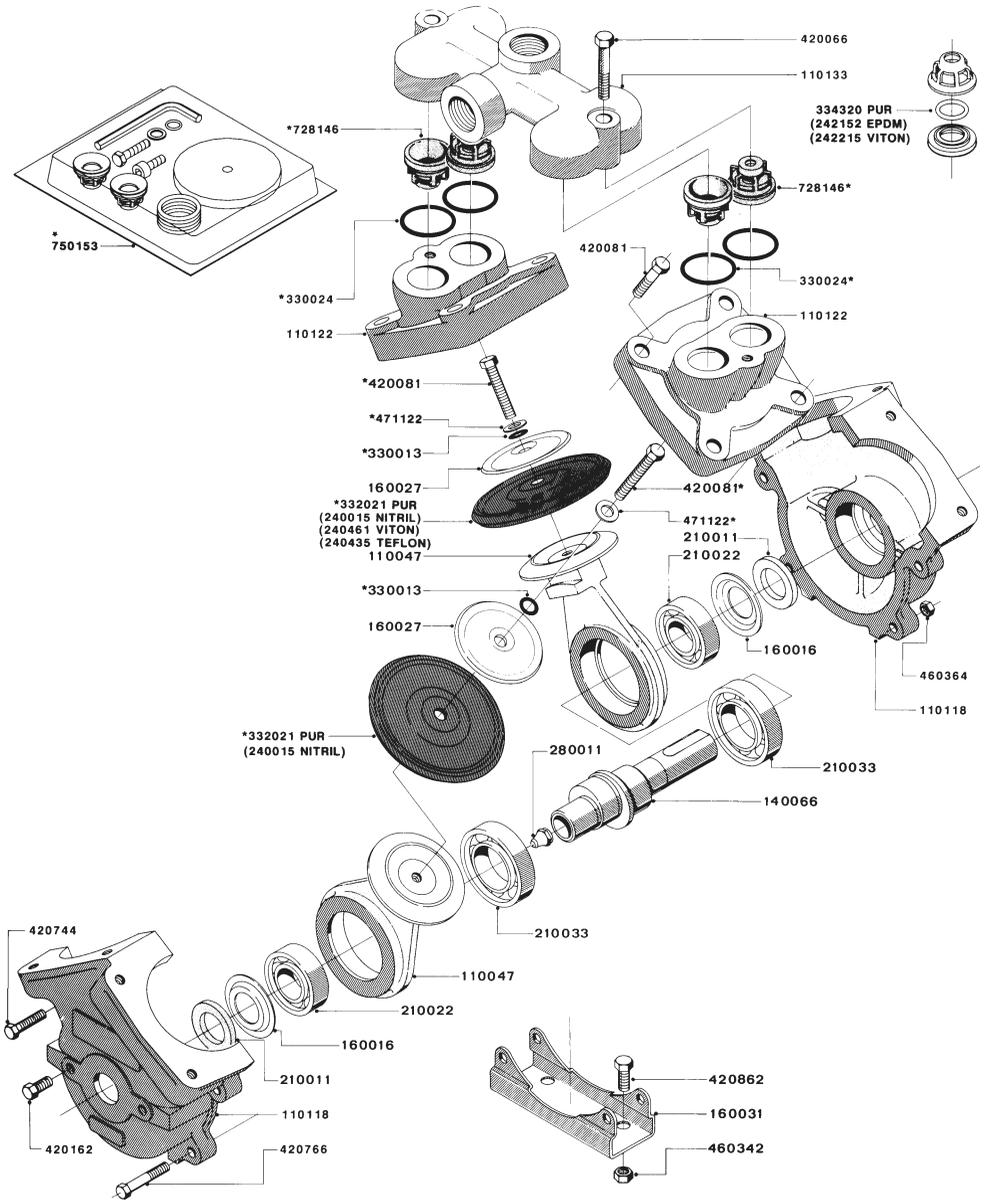


A3 500/4

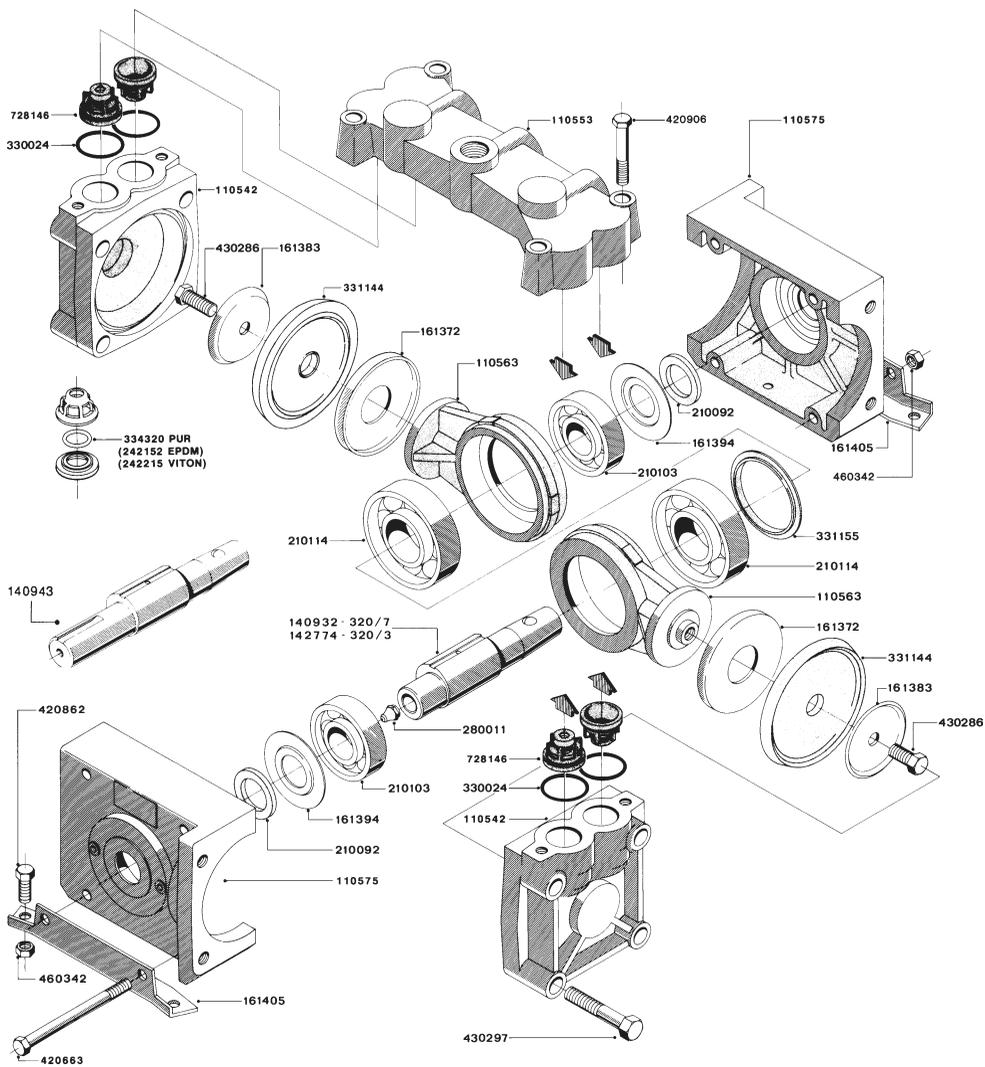


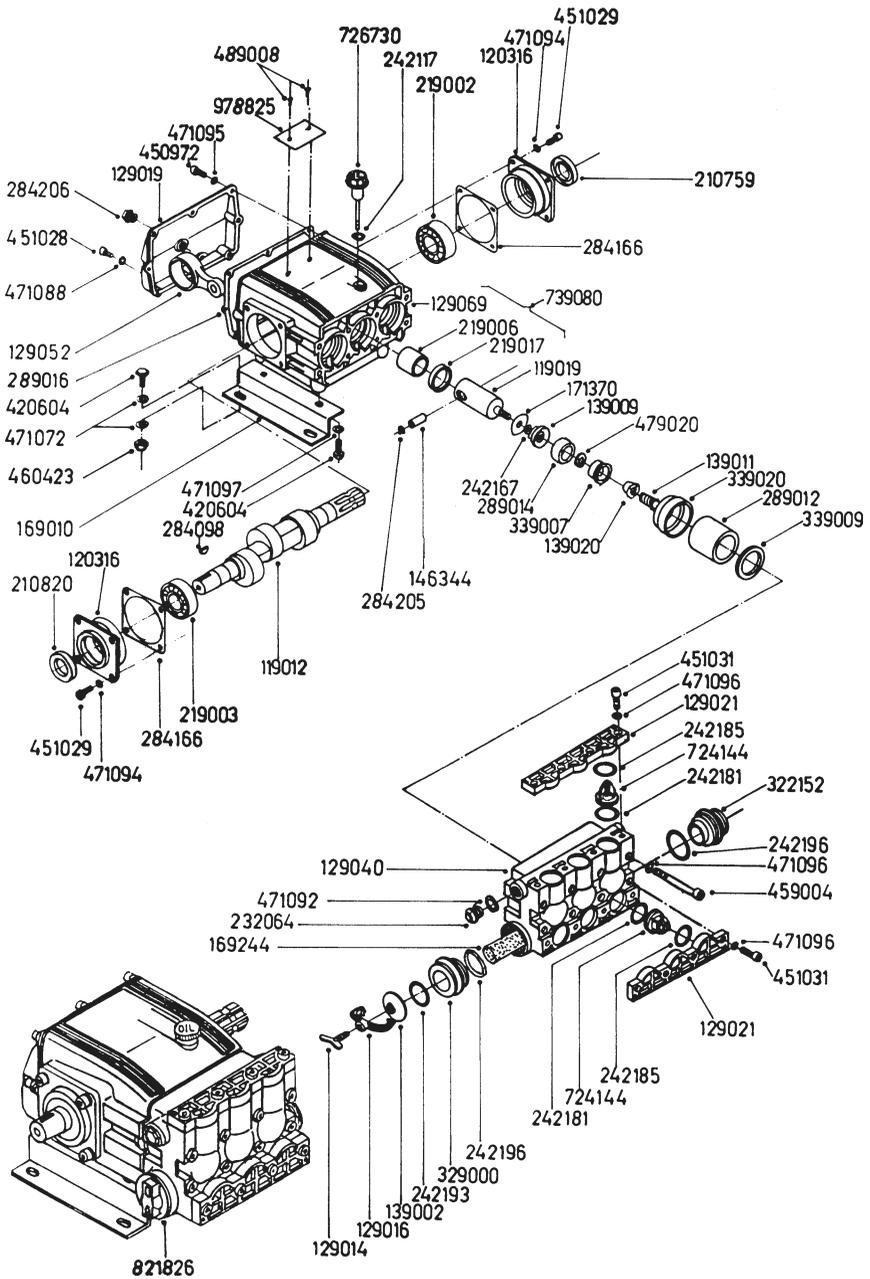
500/HT

A4



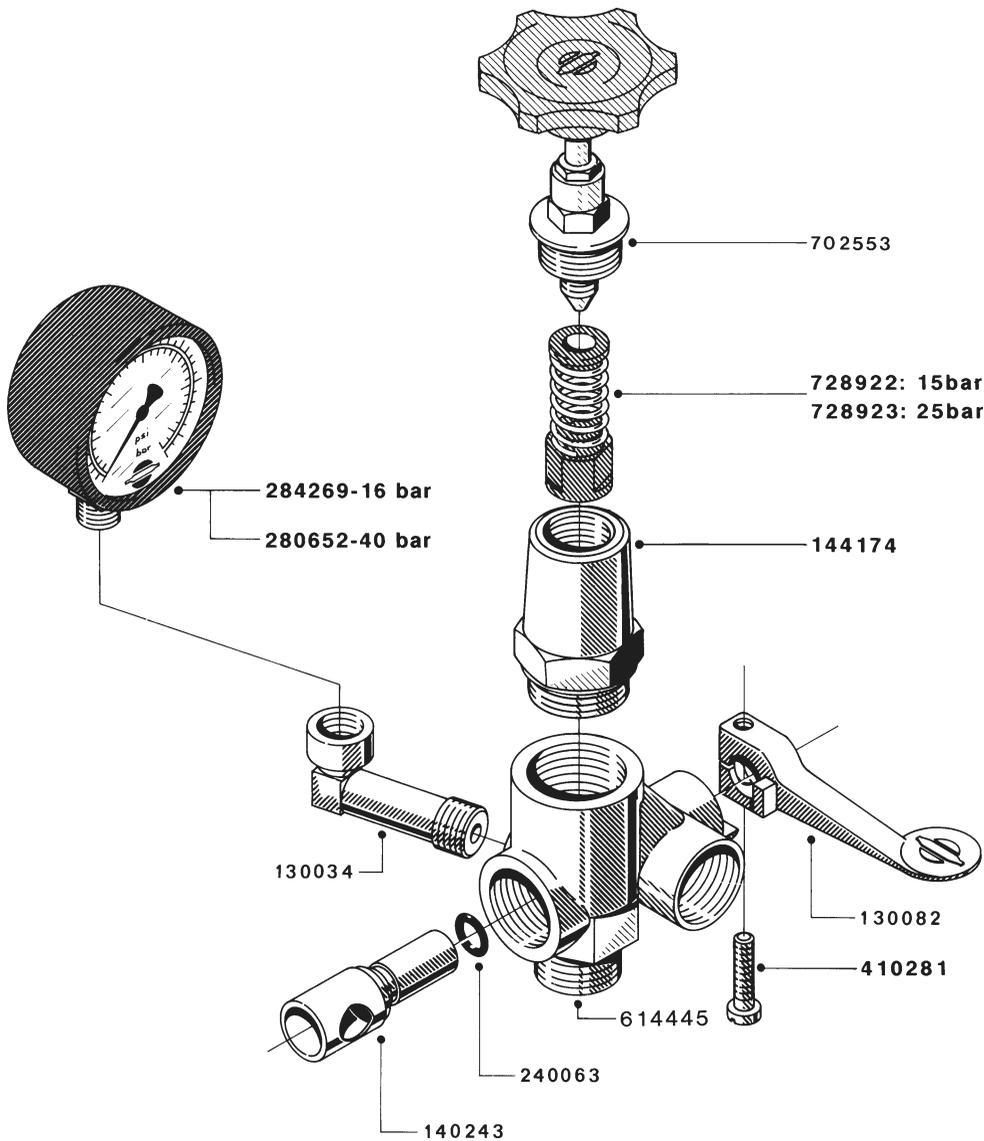
A7 600/4





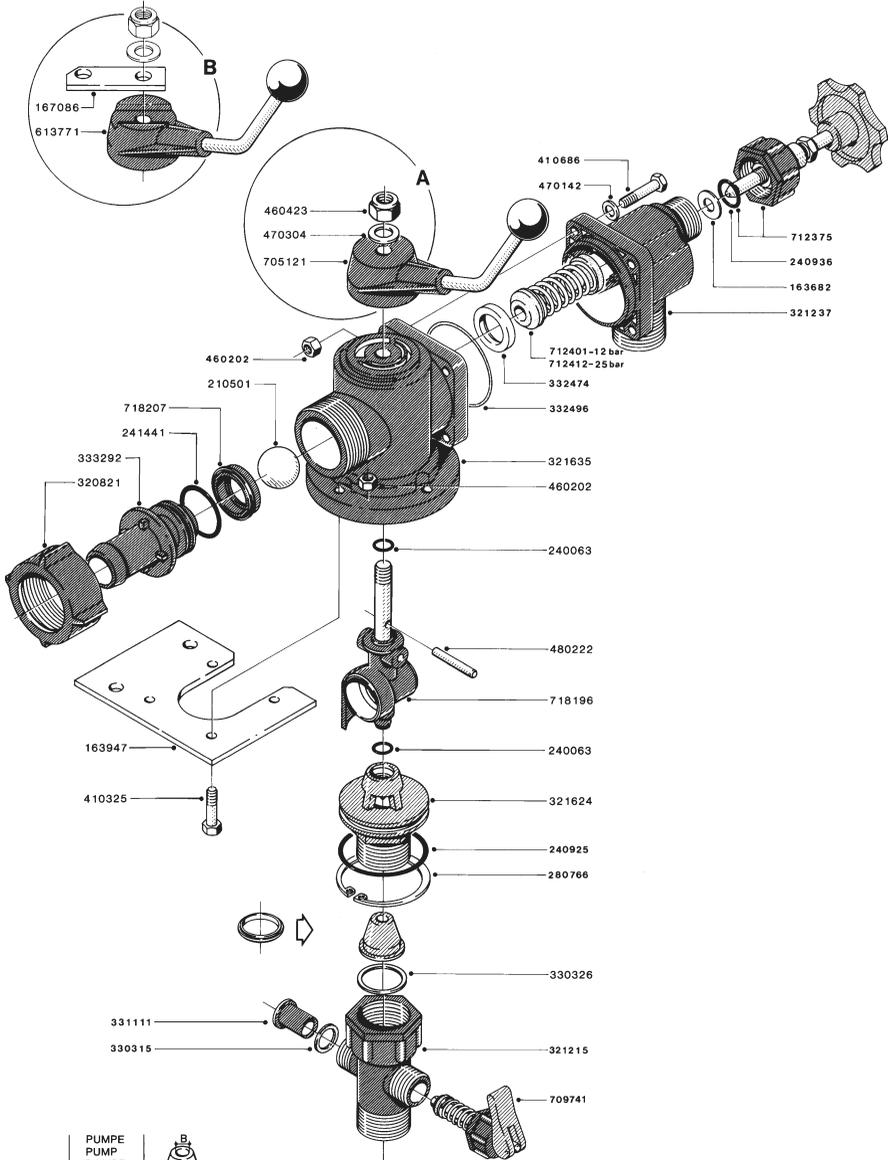
A103

P-3-L



Unit M600/600HT

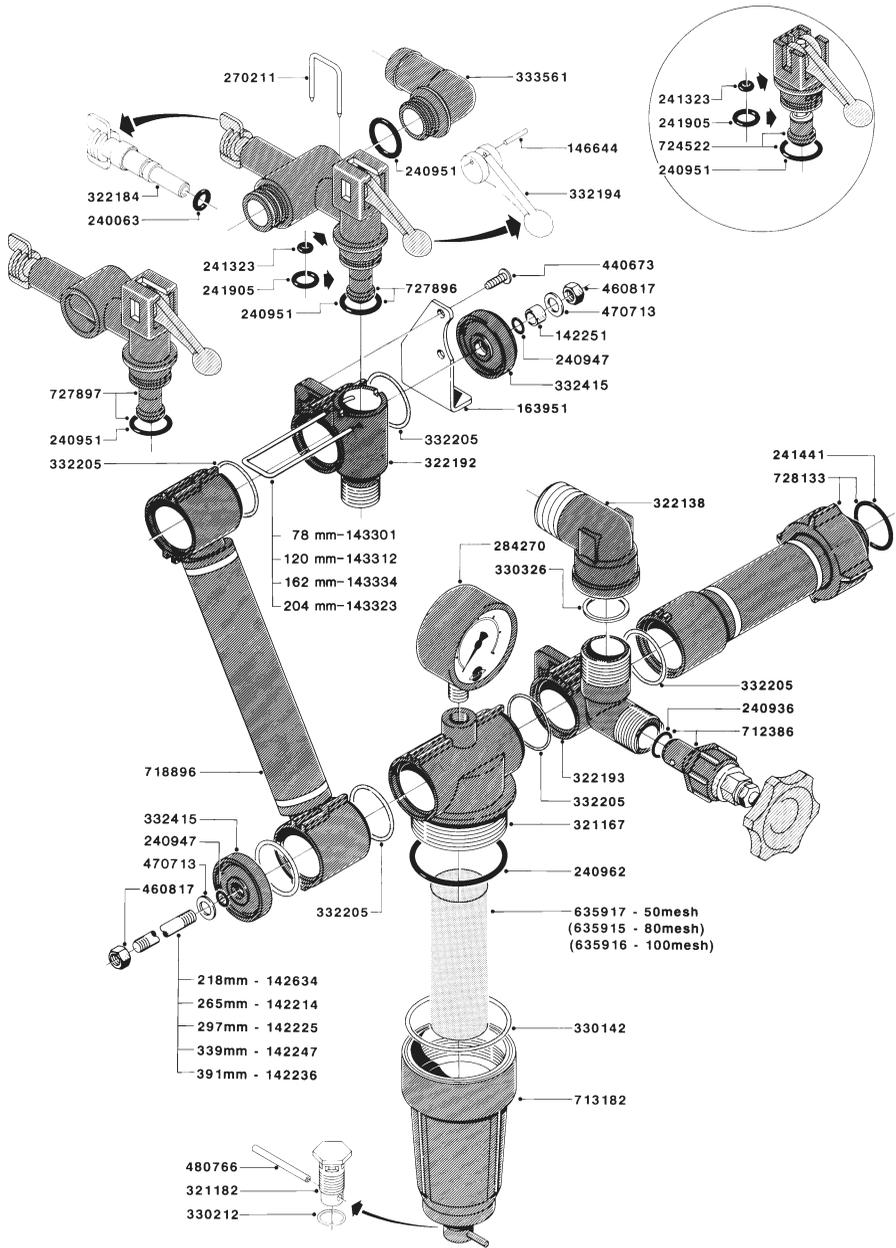
B1



PUMPE PUMP POINPE PUMPE BOMBA		B mm	FARVE	COLOUR	COULEUR	FARBE	COLOR	
600	333314	5,2	BLA	BLUE	BLEU	BLAU	AZUL	
1202	333325	7,3	RØD	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	
462								145305

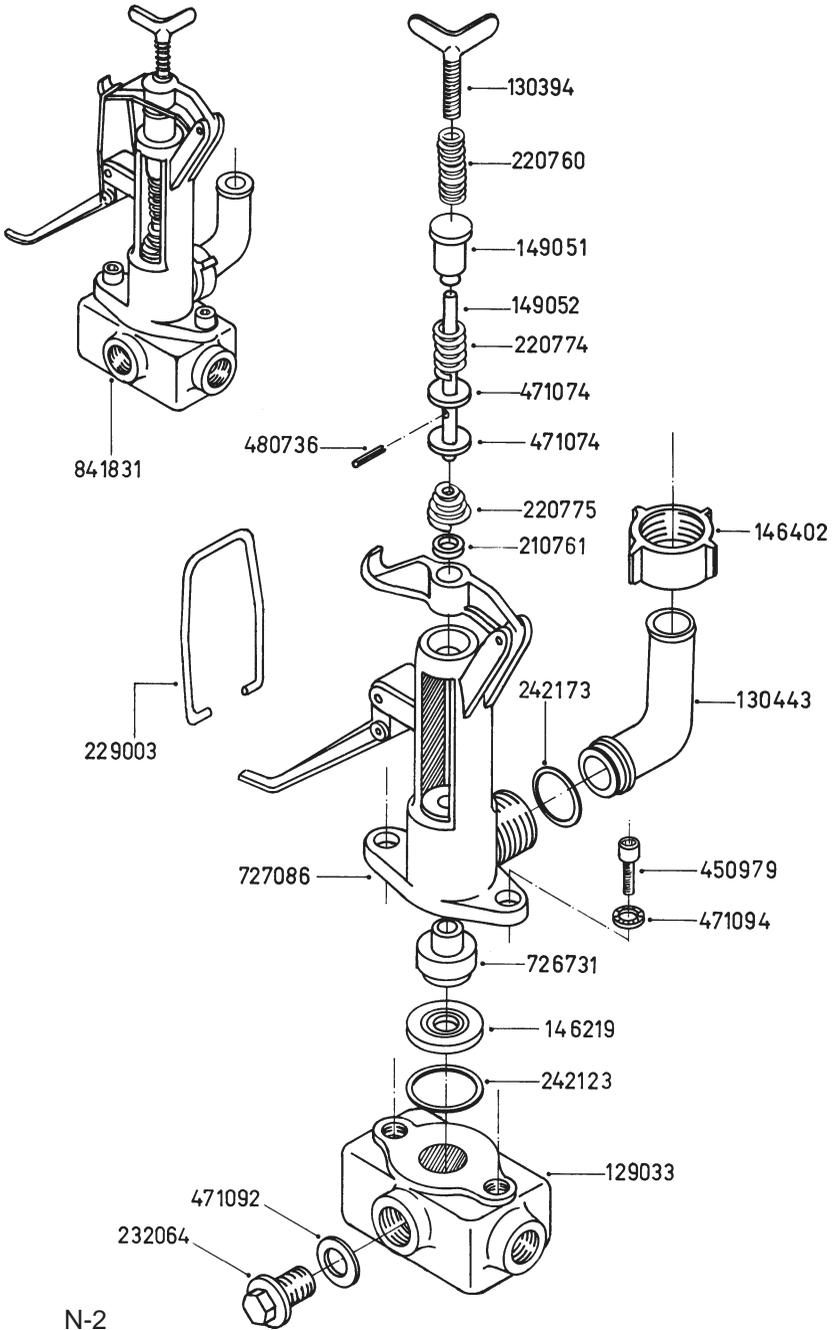
B7

BK180K



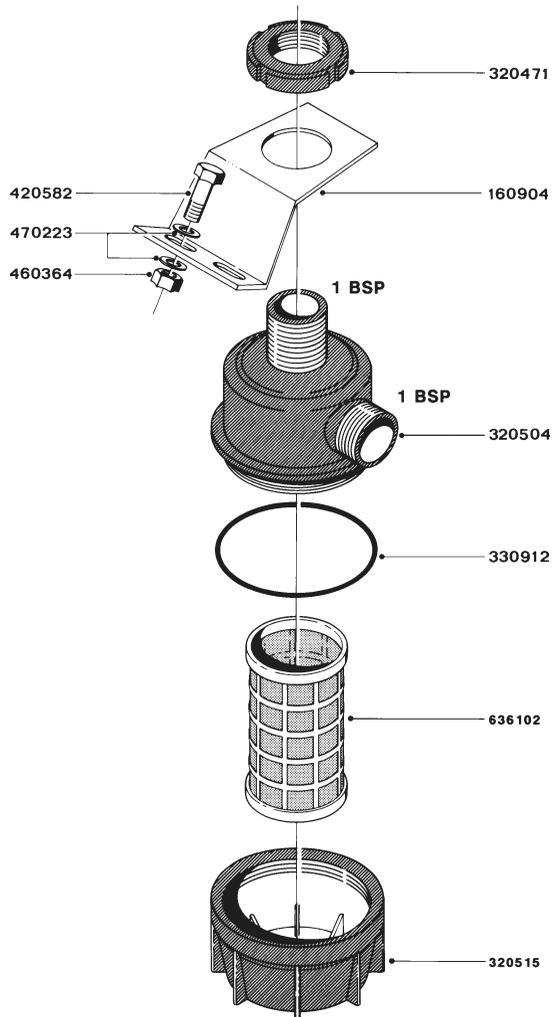
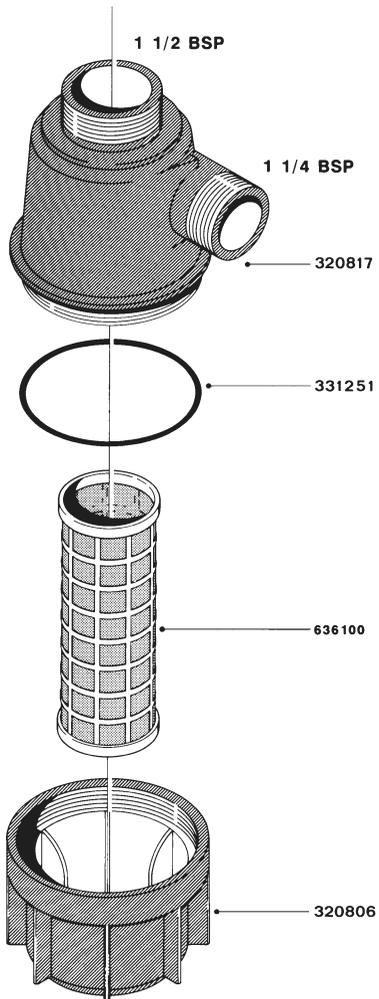
Distribution valves, BK180

B10



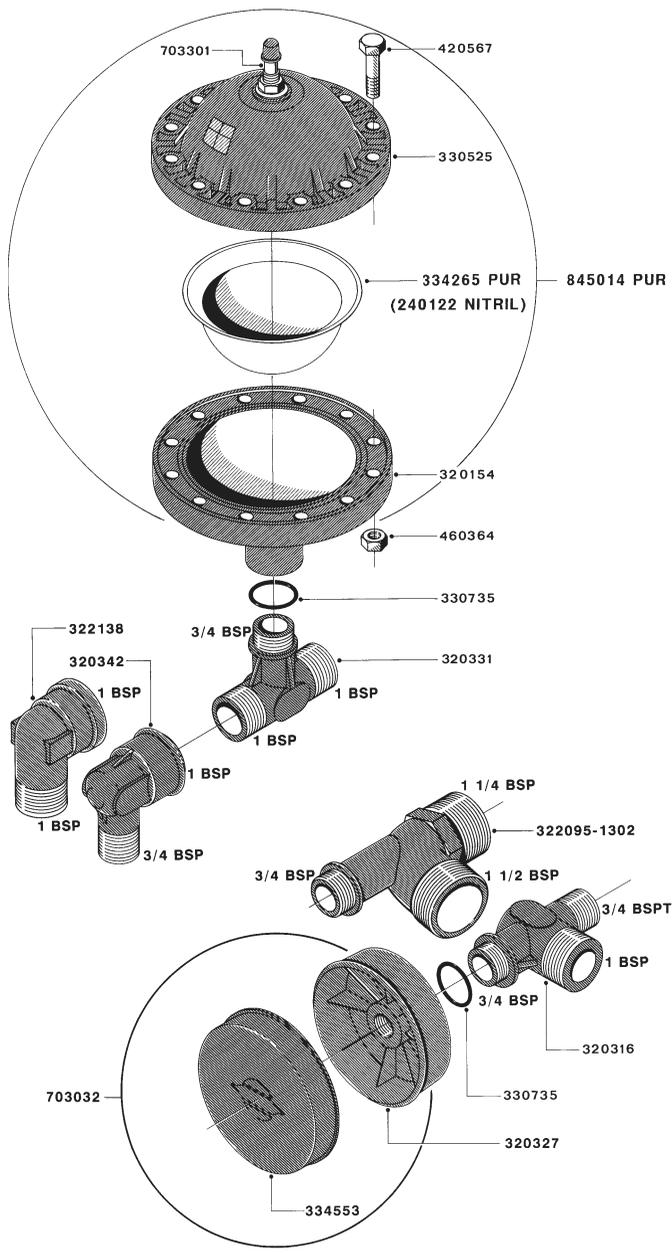
B12

N-2

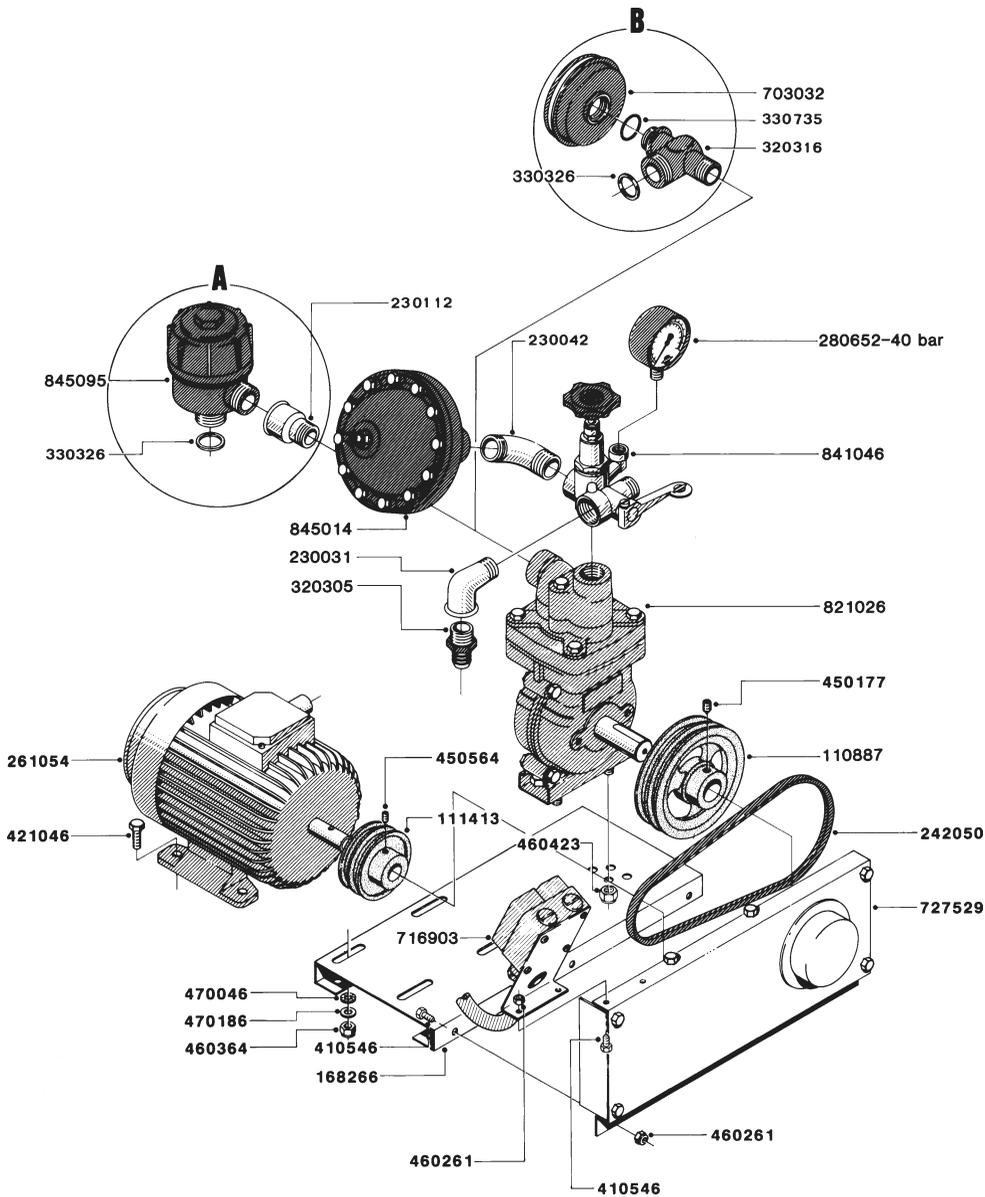


Suction filter

B200

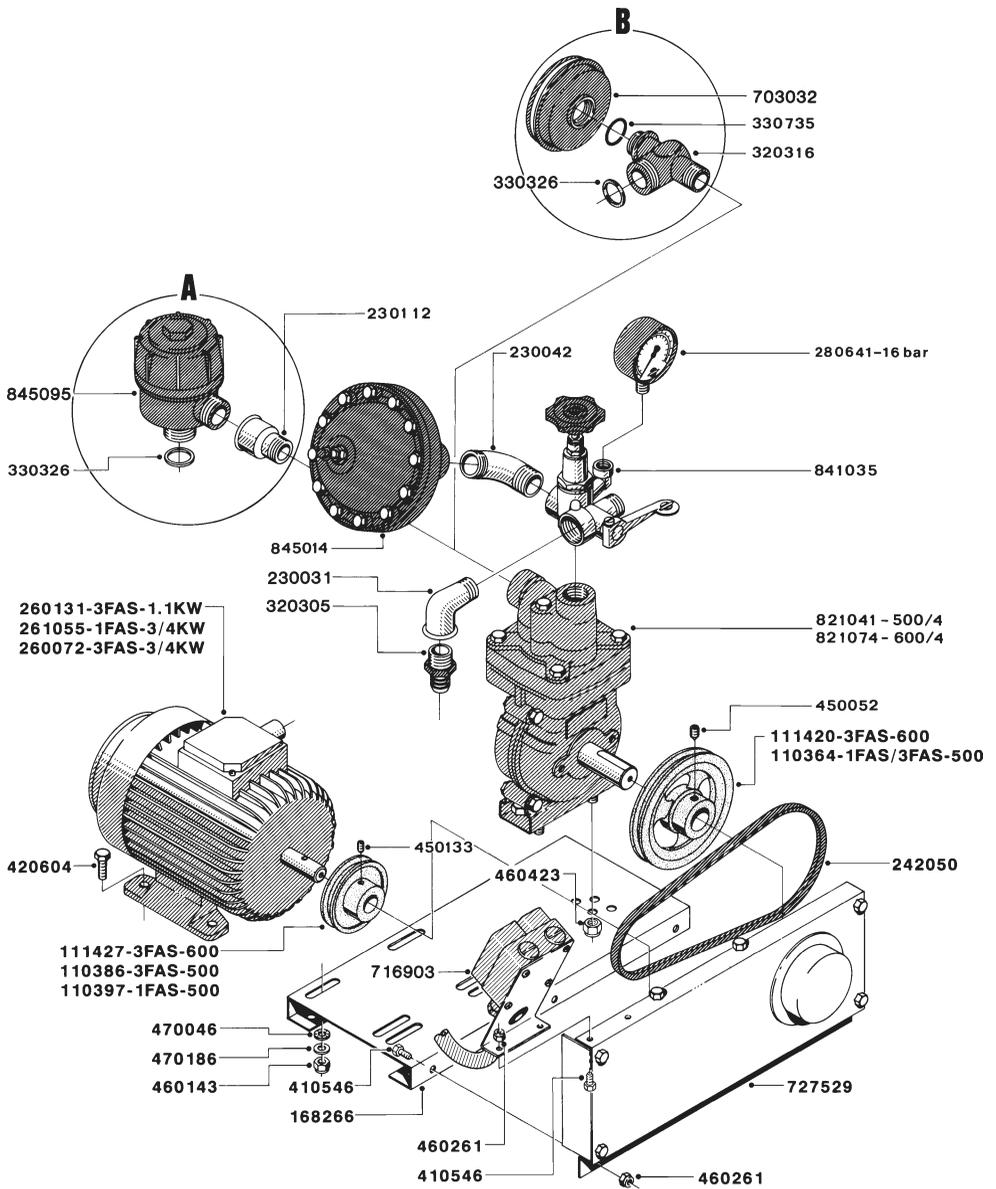


B300 Suction/pulsation dampers

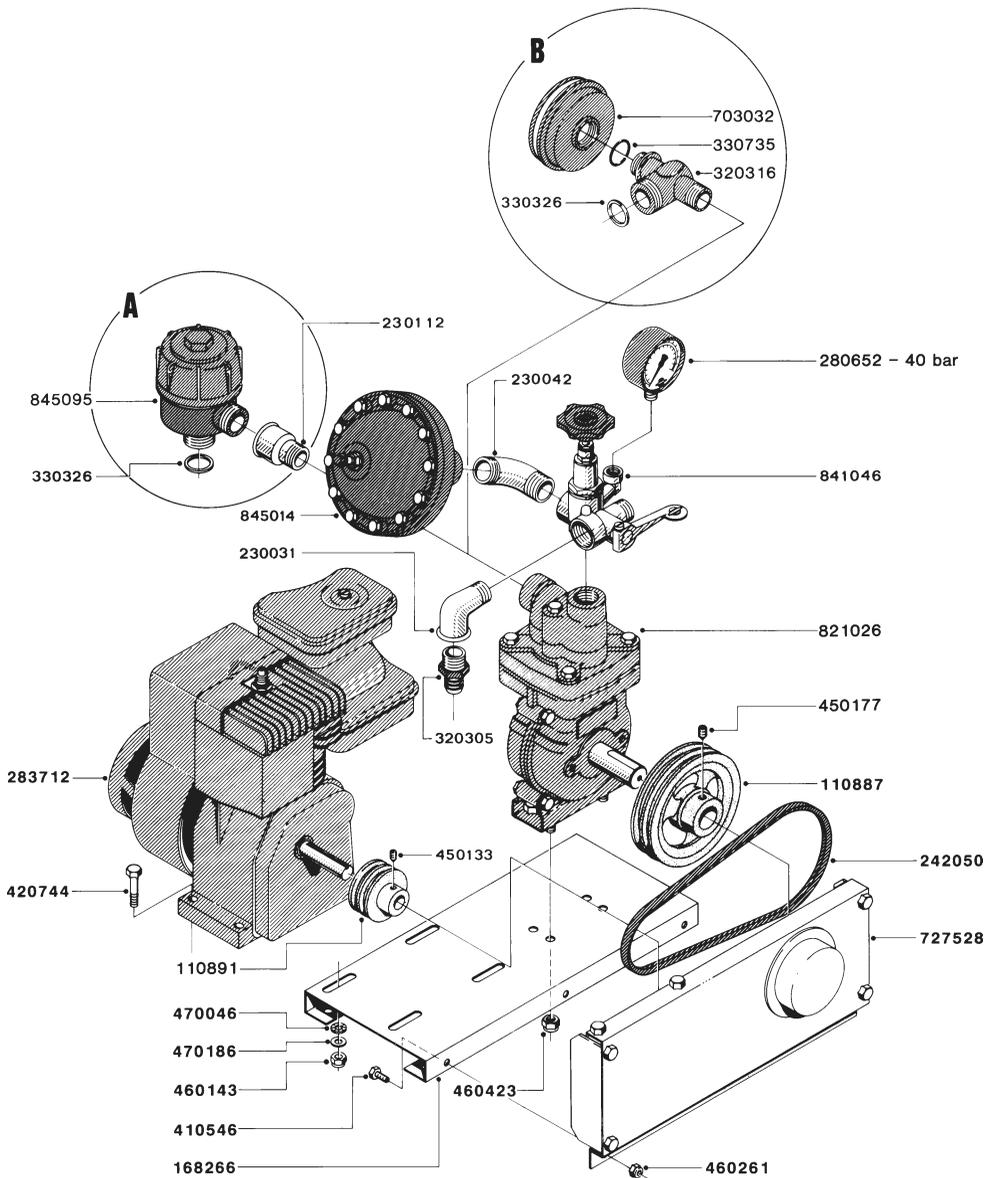


500HT, el.

H1

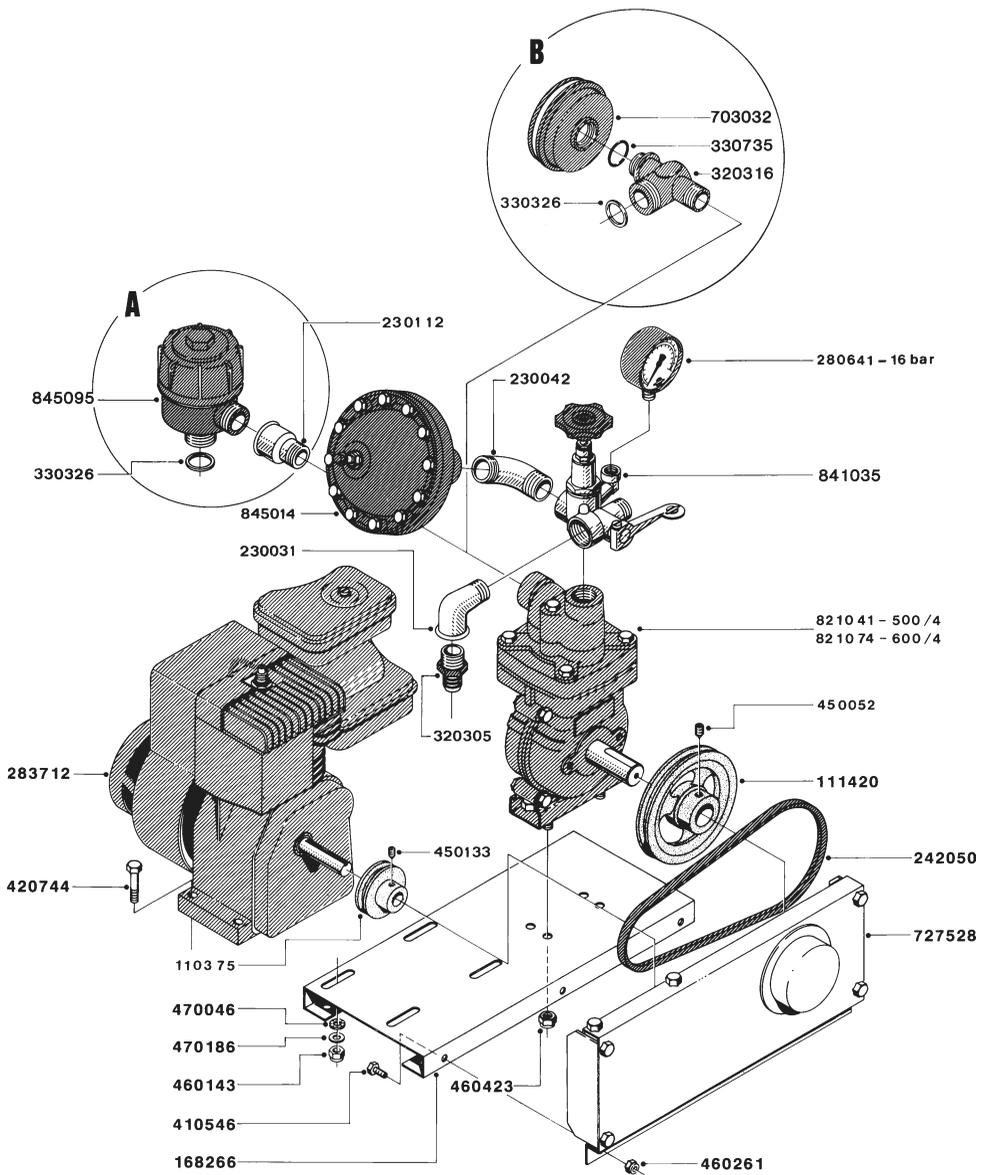


H2 500/600, el.

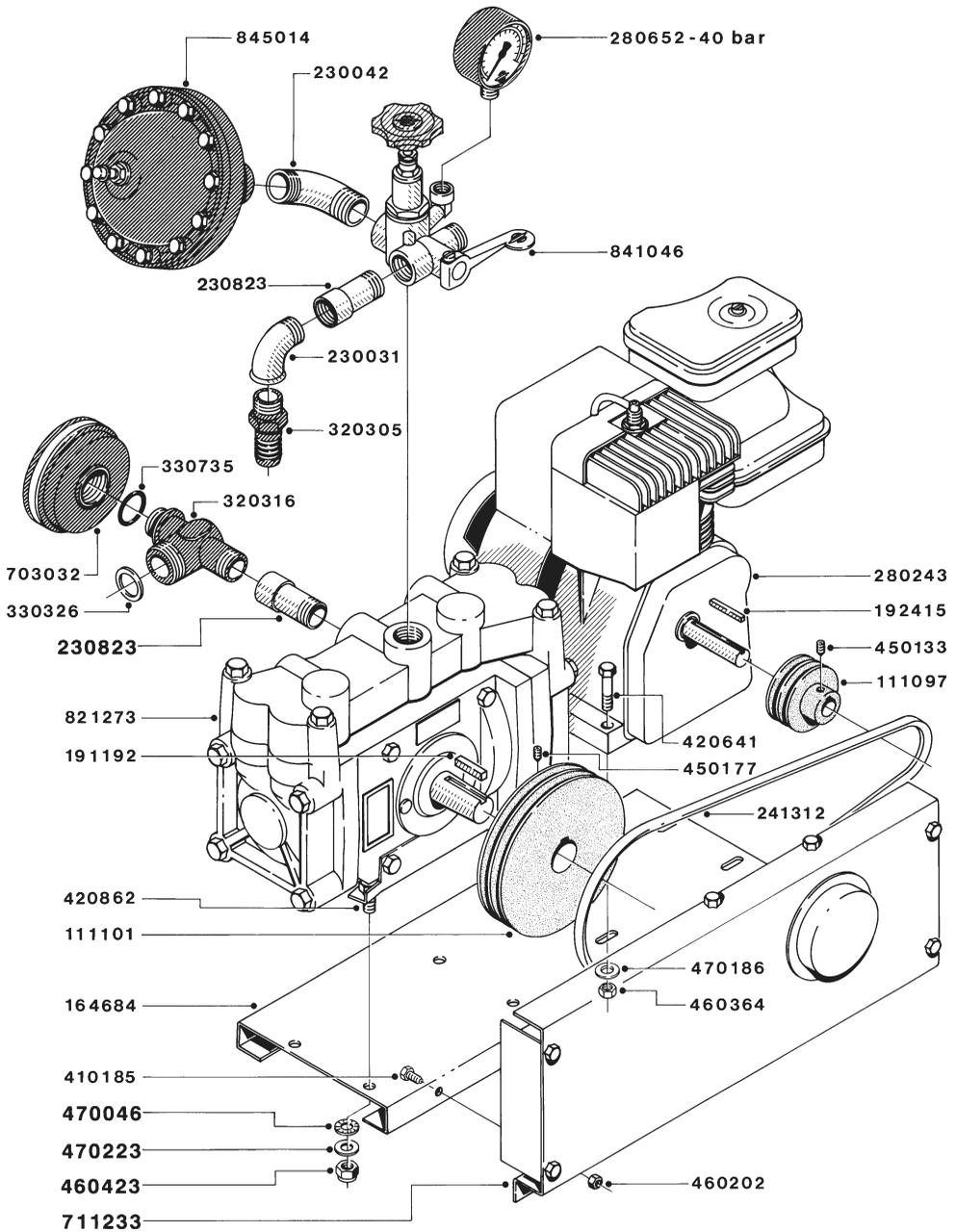


500HT, petrol

H3

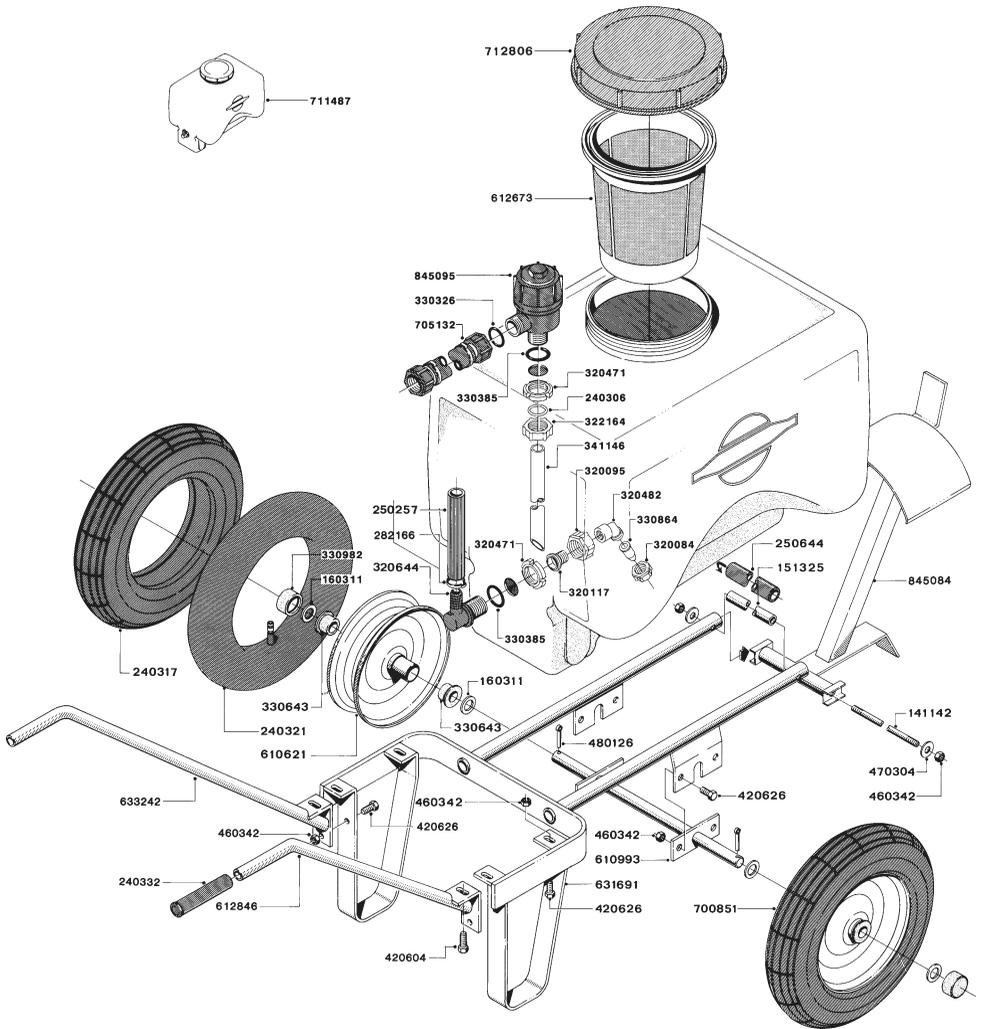


H4 500/600, petrol



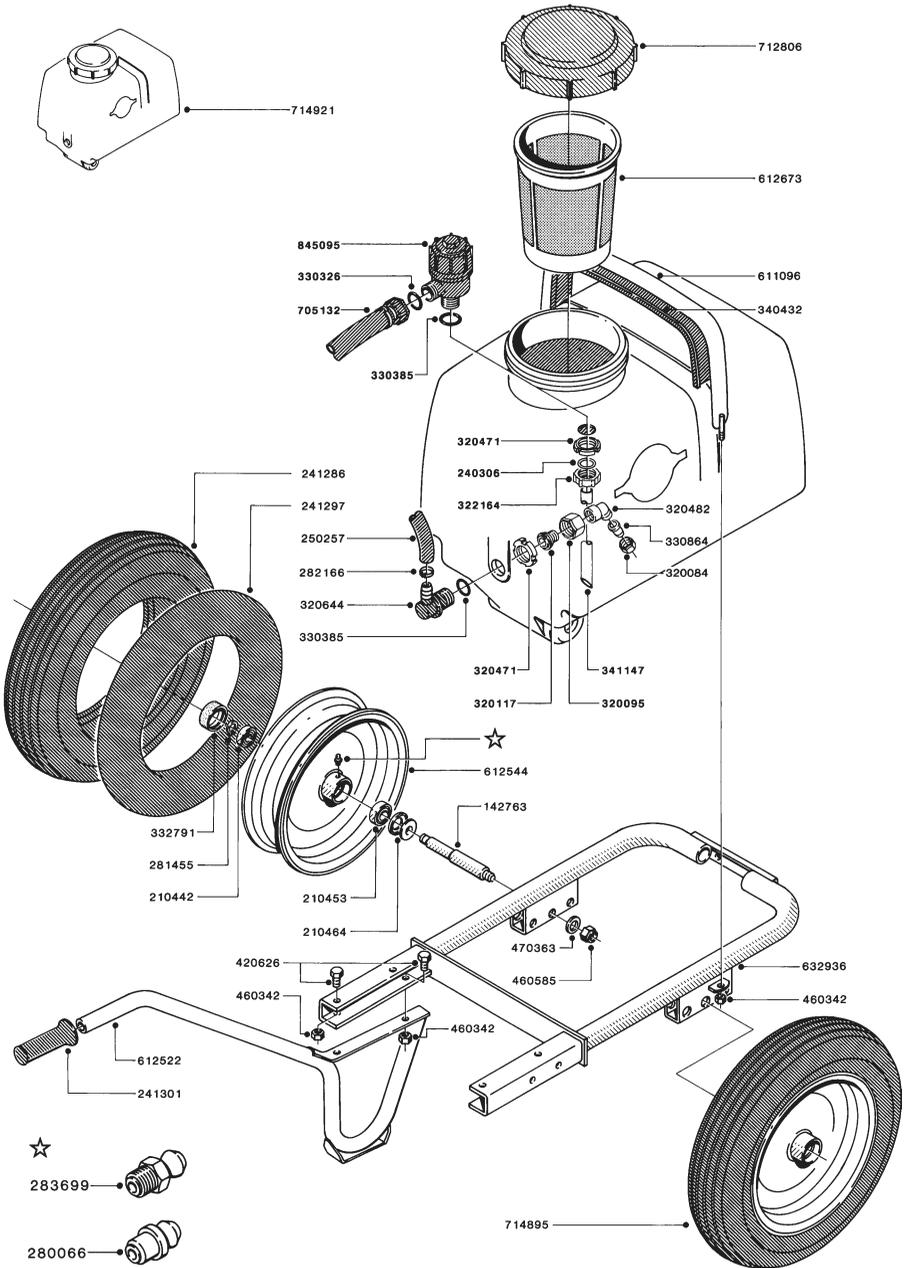
320, petrol

H5



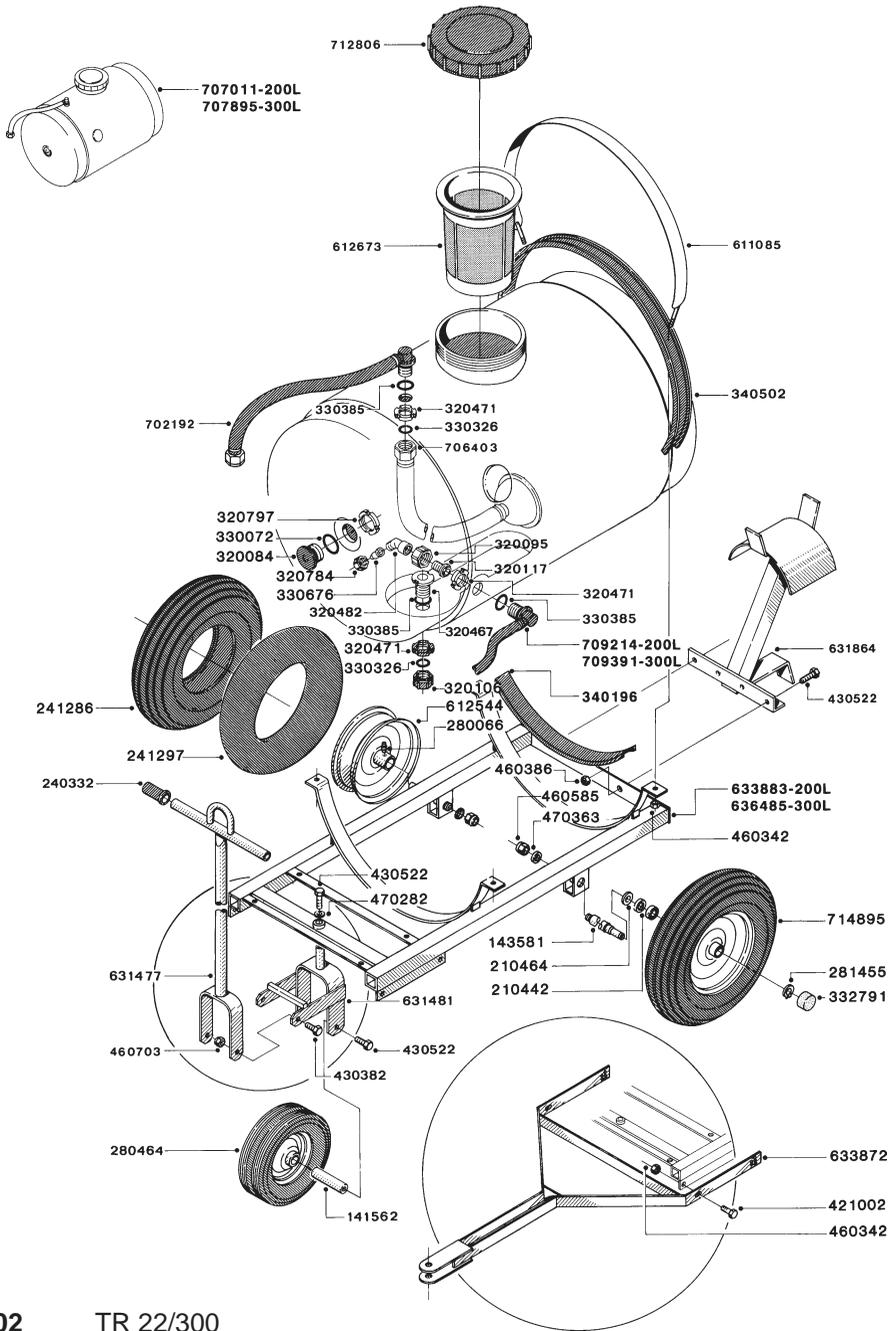
H100

KS 100



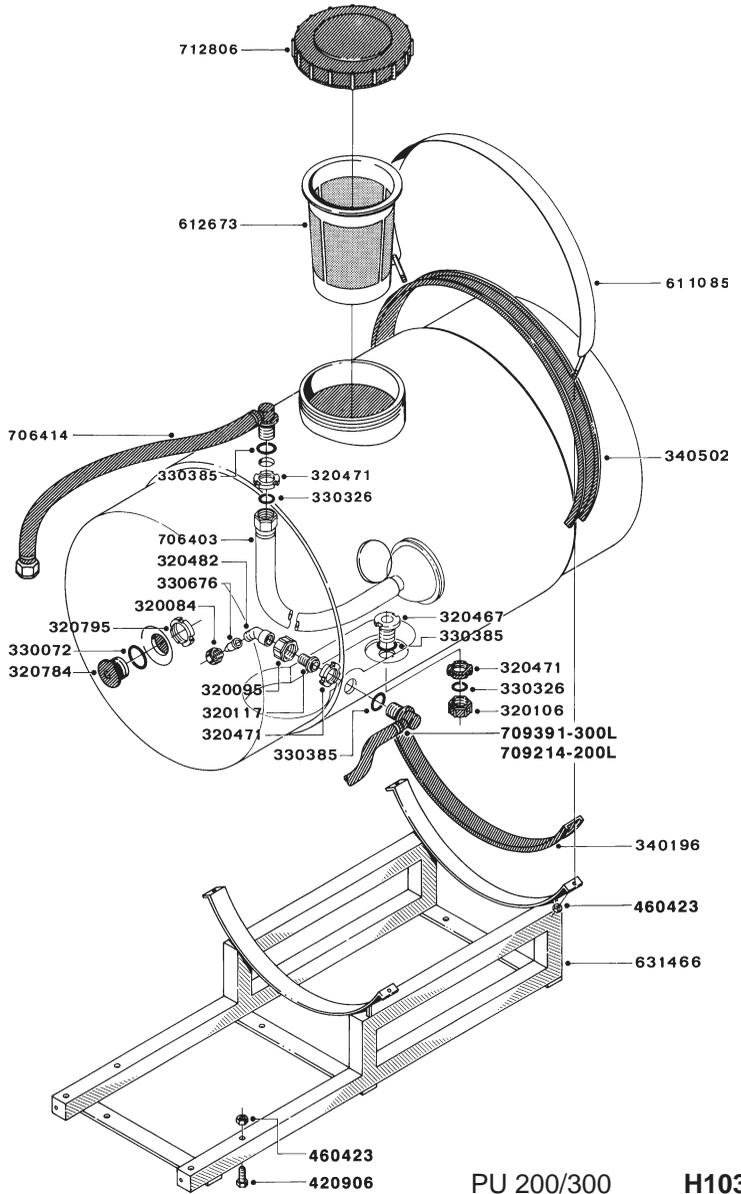
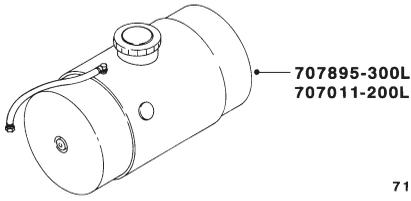
KS 120

H101



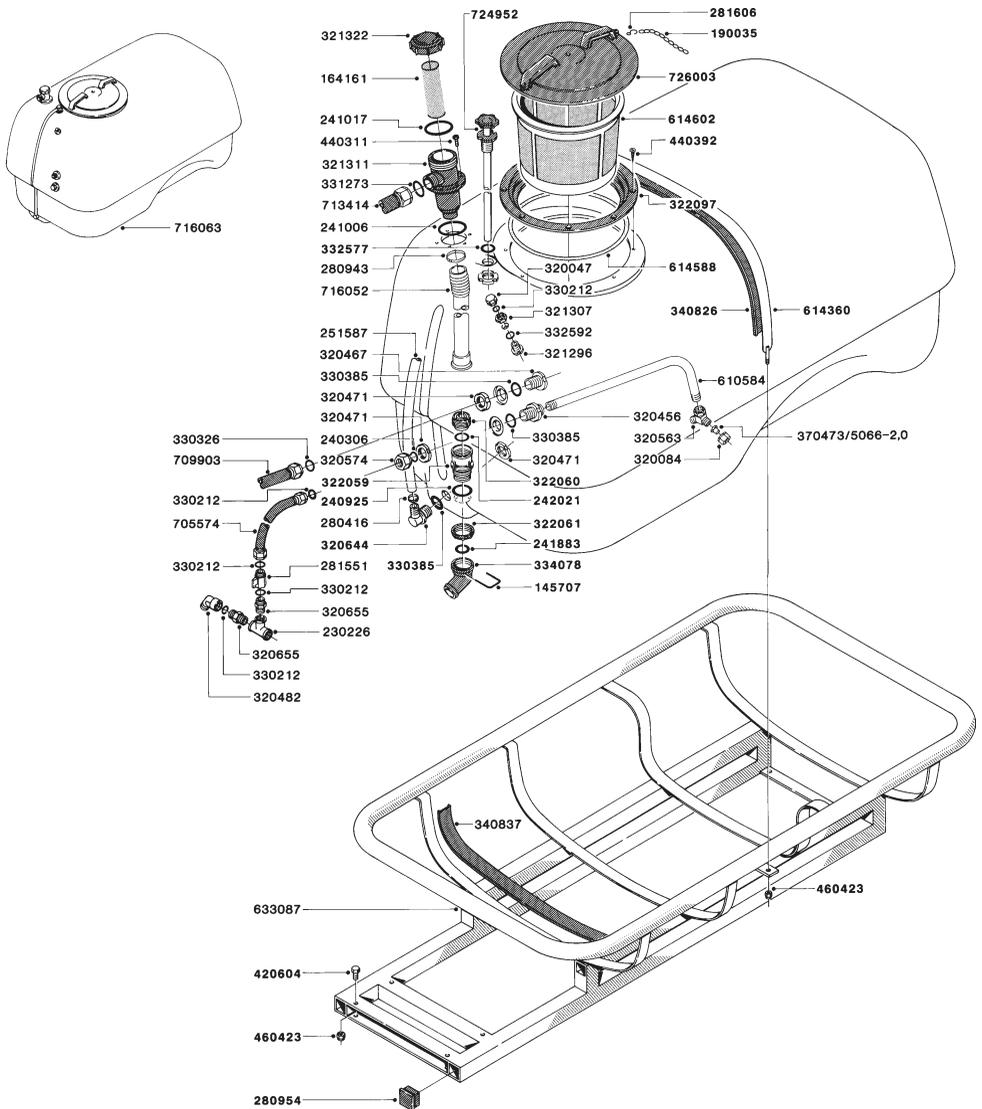
H102

TR 22/300

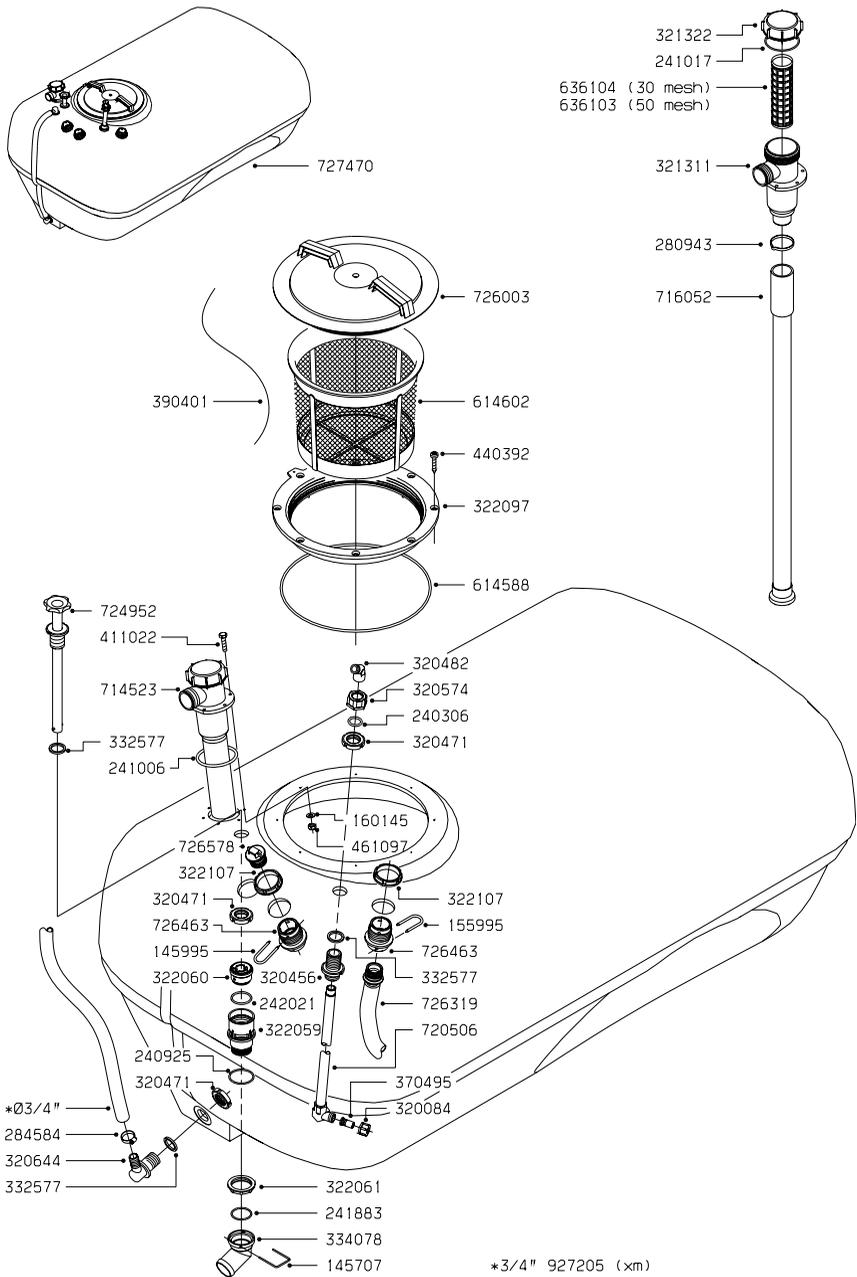


PU 200/300

H103

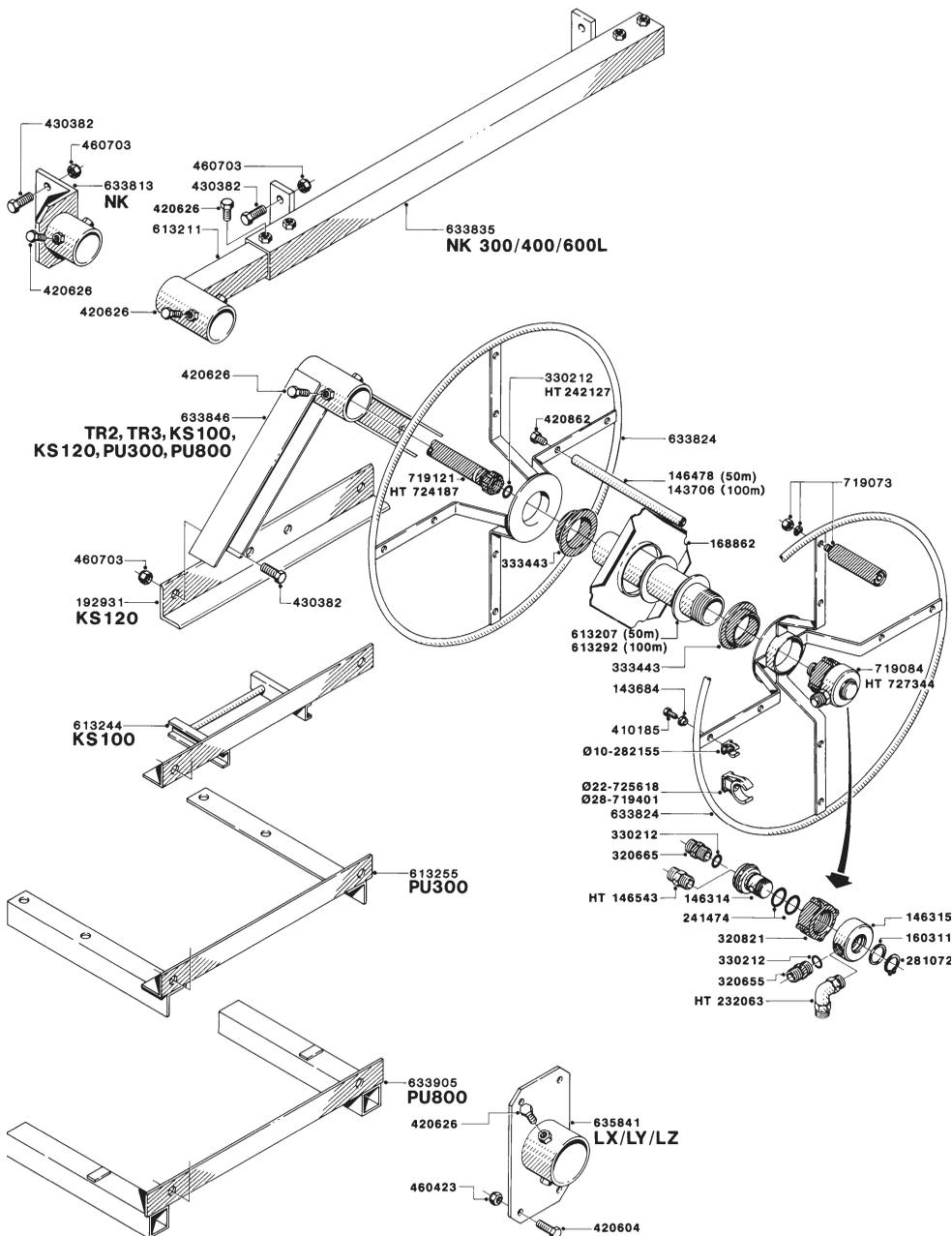


H104 PU 800

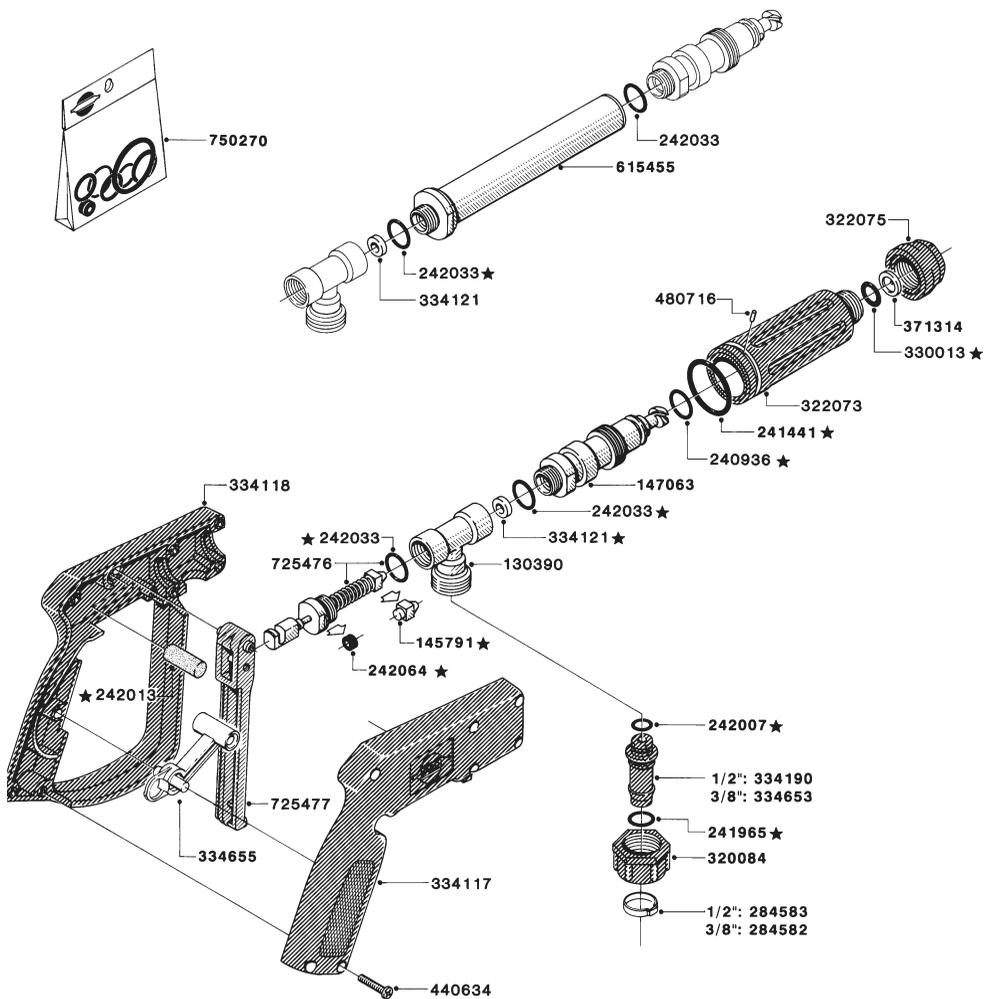


PU/TPS

H108

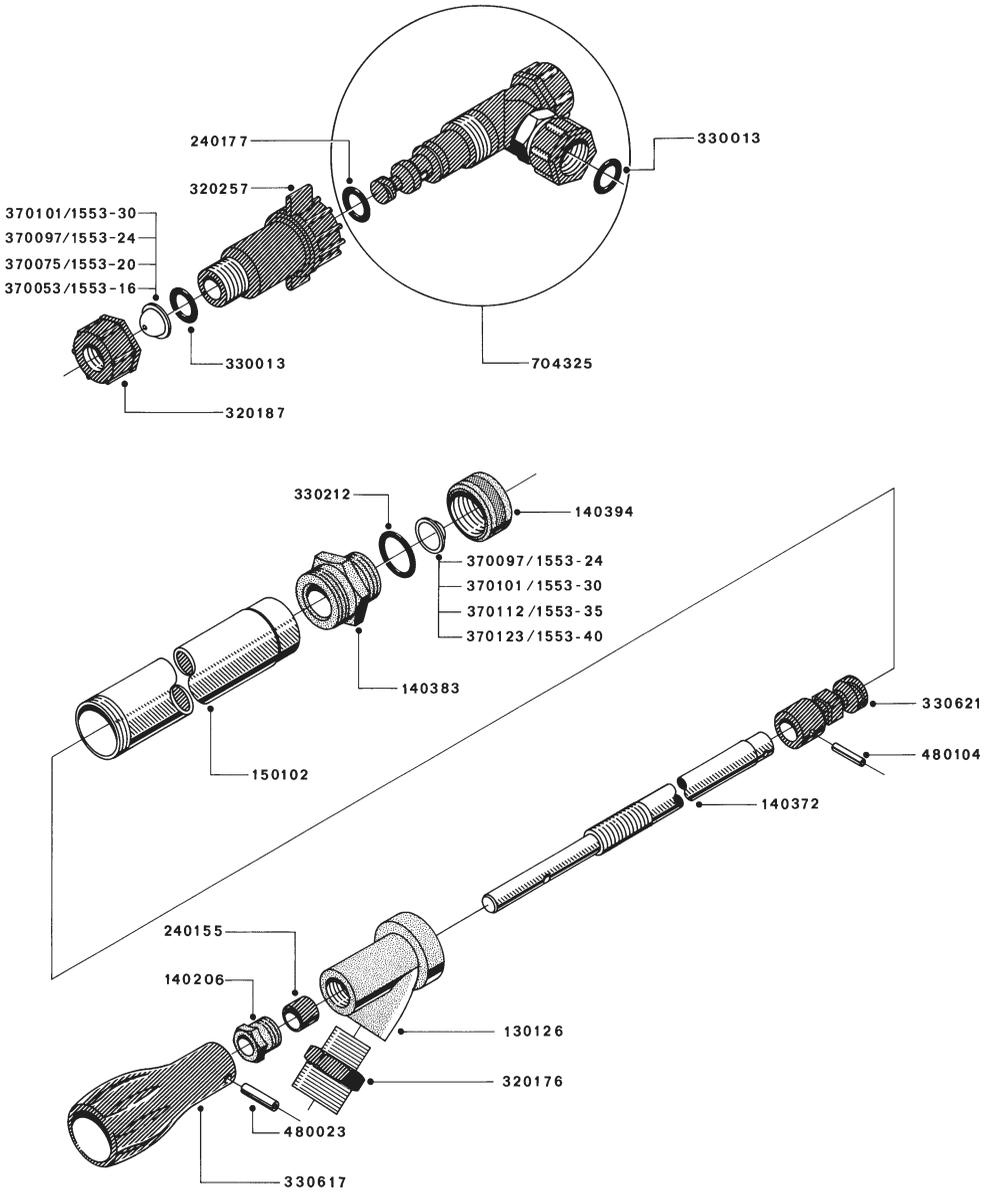


K 105 Hose reel with bracket

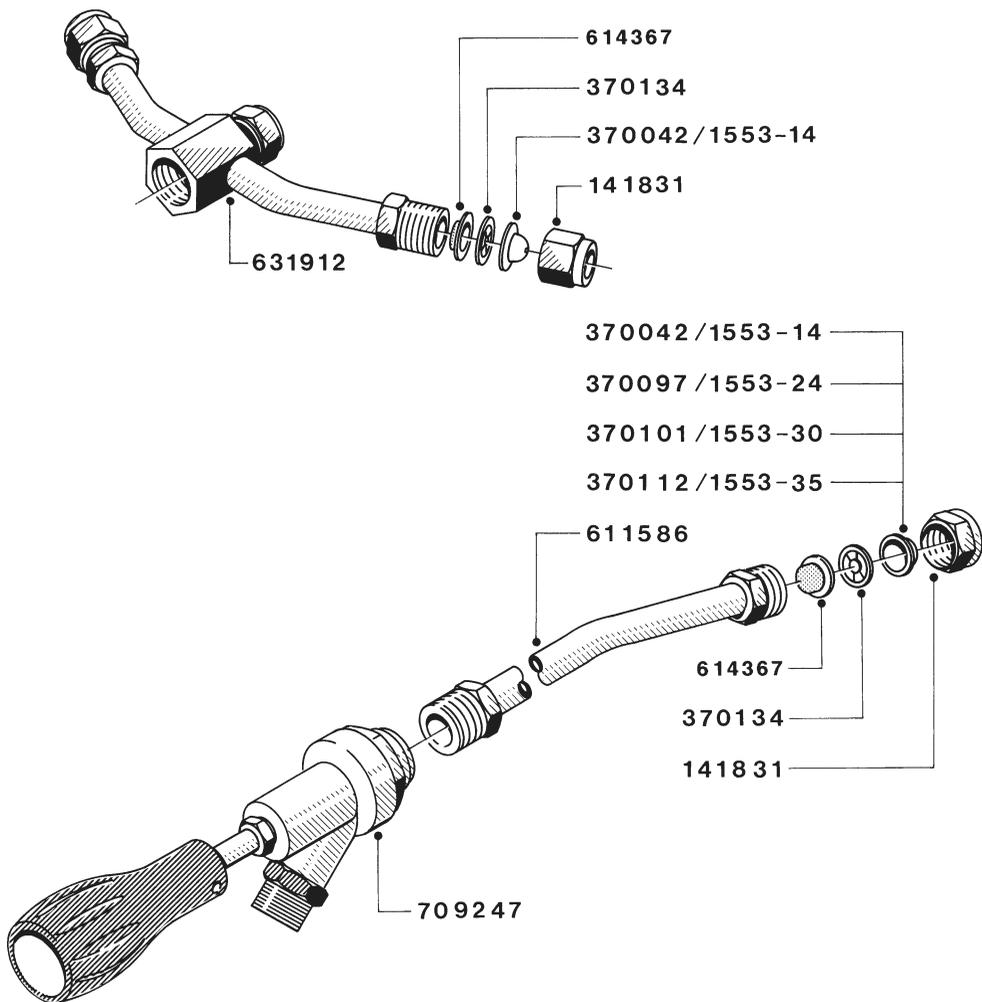


60 S/L

K110

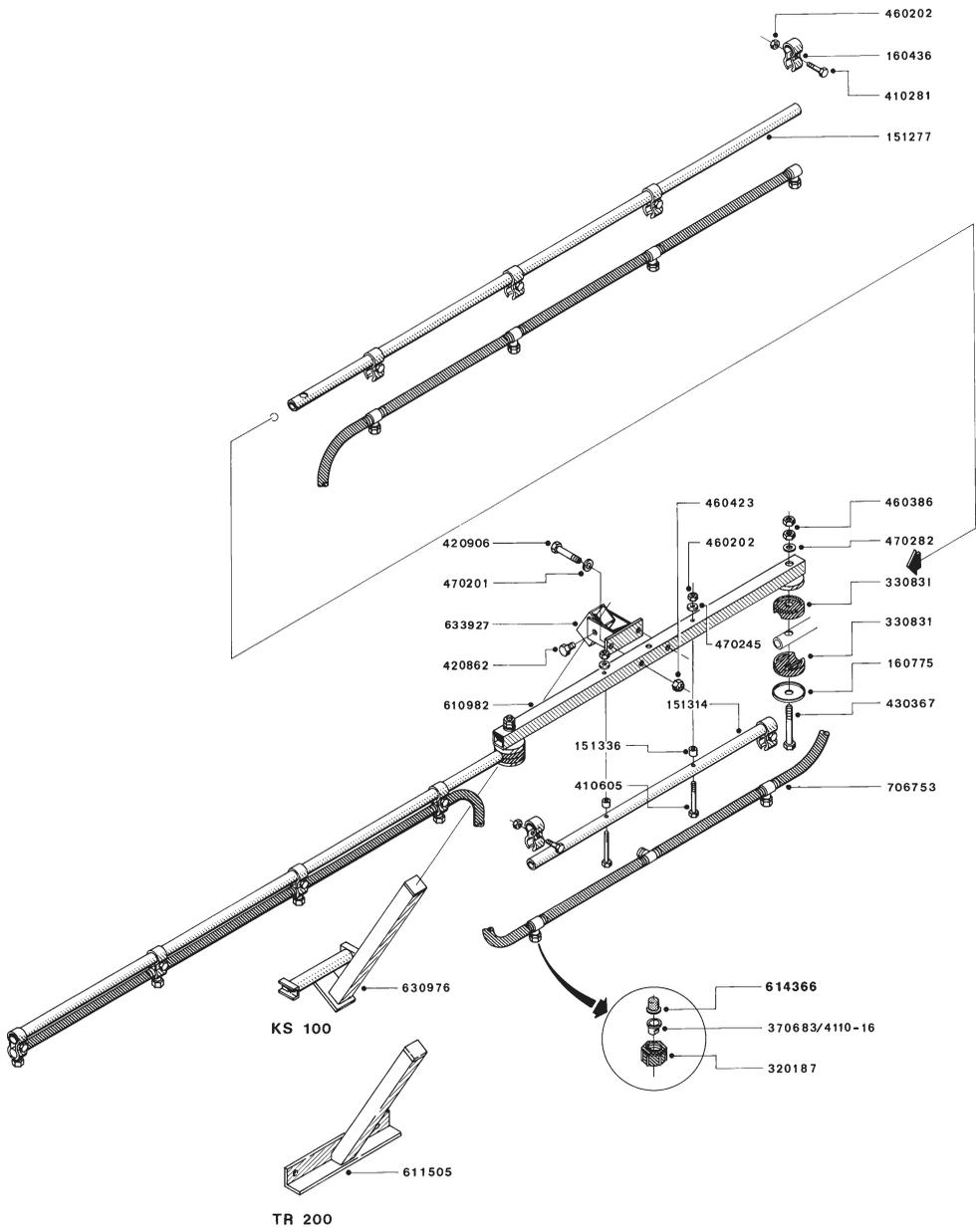


K 112 Spray lance (adjustable)



Spray lance/3-way nozzle tube

K113



K 400 4 m boom KS/TR