

InEX

OWNER'S MANUAL

FOR



InEx 200/400 Engine Driven SPRAYERS Flatdeck & Trailed

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SAFETY PRECAUTIONS

TRAILED SPRAYERS

AN IMPORTANT MESSAGE FOR OWNERS & OPERATORS OF In-Ex ATTACHMENTS/ACCESSORIES

Be warned of the dangers of loading your vehicle in excess of its carrying capacity.

It is important to understand that any loads or attachments whether fastened to or placed on a vehicle will alter the stability or handling characteristics of that vehicle.

Spray tanks or other equipment must be filled only to a level where the gross weight is within the load limit of the vehicle.

Safety is a primary concern in the design, manufacture, sale, and use of spray tanks and other equipment. As manufacturers of spray tanks and other equipment we want to confirm to you, our customers, our concern for safety. We take this opportunity to remind you about the simple, basic and common sense rules of safety when using spray tanks and other equipment. Failure to follow these rules can result in severe injury or death to operators and bystanders.

It is essential that everyone involved in the assembly, operation, transport, maintenance and storage of this equipment be aware, concerned, prudent and properly trained in safety.

This also applies to equipment that is loaned or rented to someone who has not read the owner's manual and is not familiar with the operation of application equipment.

- NEVER EXCEED THE LOAD LIMIT CAPACITY OF THE ATV OR OTHER VEHICLE.
- ALL ATV AND TRAILED EQUIPMENT TYRES SHOULD BE INFLATED TO MANUFACTURERS RECOMMENDED OPERATING PRESSURES.
- PLEASE NOTE THAT FILLING THE SPRAY TANK OR OTHER EQUIPMENT COMPLETELY AND OR THE ATTACHMENT OF ADDITIONAL EQUIPMENT TO THE ATV MAY EXCEED THE ATV'S MAXIMUM LOAD CAPACITY AND IT IS NOT RECOMMENDED TO EXCEED MANUFACTURERS GUIDELINES
- CARGO SHOULD BE PROPERLY DISTRIBUTED AND SECURELY ATTACHED.
- REDUCE SPEED WHEN CARRYING CARGO OR PULLING A TRAILER OR TRAILED APPLICATION EQUIPMENT AND ALLOW GREATER DISTANCE FOR BRAKING.
- NEVER ALLOW ANYONE TO RIDE ON YOUR SPRAYER OR OTHER EQUIPMENT.
- ALWAYS FOLLOW THE INSTRUCTIONS IN THE OWNER'S VEHICLE MANUAL FOR CARRYING CARGO OR PULLING A TRAILER.
- PROPER MAINTENANCE IN LINE WITH MANUFACTURER'S RECOMMENDED MAINTENANCE PROCEDURES IS ESSENTIAL.
- BEFORE APPLYING CHEMICALS, READ THE LABEL OF THE CHEMICAL MANUFACTURER OR SUPPLIER FOR PERSONAL PROTECTIVE EQUIPMENT AND OPERATE AS RECOMMENDED.

THE SAFETY OF ALL CHEMICALS USED IN AGRICULTURE IS UNDER THE JURISDICTION OF A GOVERNMENT AGENCY, IE N.Z. MINISTRY FOR THE ENVIRONMENT; USA ENVIRONMENTAL PROTECTION AGENCY. FURTHER LOCAL GOVERNMENT OR STATE LAWS MAY APPLY.

WARNING

To reduce the chance of VEHICLE instability, it is recommended to exercise EXTREME care while spraying on a slope or hillside.

CAUTIONS, WARNINGS and NOTES

Throughout this document, text has been highlighted as warnings, cautions and notes.

Warnings are mandatory instructions. Failure to comply with these instructions may result in injury or damage.

Cautions are advisory. Failure to comply may result in poor operation or premature failure.

Notes are to assist with convenient operation of the equipment.

SAFETY

Before attempting to install or operate the equipment, read and understand the manual thoroughly. Failure to comply with this instruction constitutes improper use and will invalidate the warranty.

Before using your pesticide, STOP, Read The Label

Mixing pesticides is a most dangerous time as it involves handling the concentrated material. For toxic compounds, use protective clothing such as overalls, hat, gloves, boots and respirator.

When using concentrated sprays, full protection is necessary.

When using diluted sprays, wear a hat, long-sleeved cotton overalls, and boots. If you use pesticides regularly, it is a good idea to always wear a respirator to avoid cumulative effect.

Other protection may be required. Check the label. It may have specific directions for the particular chemical.

Protective clothing should be properly cared for. Rinse heavily contaminated clothes in the open before washing in the laundry.

Wash and dry protective clothing every day, but keep them separate from other washing.

Respirators need special care. Clean your respirator after spraying. Use soapy water then rinse and allow drying completely before storing in a clean plastic bag. Replace canisters in respirator after eight hours use.

InEx

Engine Driven SPRAYERS

OWNERS MANUAL

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CAUTION

The InEx Trailed units utilize floatation tyres to dampen bumps. It is essential that these tyres are not over-inflated otherwise the unit will be exposed to excessive shock. The recommended tyre pressure is 5-7 psi.

DESCRIPTION

The InEx range features a 200 or 400 Litre effective tank capacity. The frames are manufactured of sturdy steel construction, and have mountings available for a range of InEx spray booms and accessories such as hose reels and foam markers.

All frames are finished in high quality coatings.

A high quality multi outlet pressure regulator is fitted as standard to all engine driven models.

The tanks are moulded from tough, high quality translucent UV stabilised polyethylene, molded in contents scale, and easy access lids and basket filters. All models have large capacity suction filters with removable elements.

Engine Driven models are supplied with a medium pressure Imovilli diaphragm 39L/Min pump.

SPECIFICATIONS

(Specifications subject to change without notice)

Frame	Trailed OR Flatdeck, Zinc Plated steel
Wheels	22x11x8 Knobbly tubeless (Trailed Only)
Tyre pressure	7 psi (Trailed Only)
Drawbar	Dual strut- Rigid (Trailed Only)
Tow Coupling	1 7/8" (Trailed Only) Optional 50mm (Aus Models) Optional 50mm with swivel (UK Models)
Tank Size	200 or 400 litre translucent UV stabilised polyethylene
Tank Vent	One way poppet valve
Filters	Filling filter basket In line suction filter
Shut off Valve	Inline valve (engine driven)
Pump	Imovilli engine driven M35 - 39L/Min 580 psi
Pump Oil	SAE 30 antifoam (Imovilli only)
Control Unit	Imovilli (engine driven) CD6 (400L units) Imovilli (engine driven) CD11 (200L units)
Drive	Imovilli gearbox coupled to 4HP Honda stationary motor
Towing speed	15 Kph (Maximum recommended) (Trailed Only)

IMOVILLI Gearbox Oil Levels

The correct oil quantity for the reduction gearbox between the motor and pump is 180ml. The correct oil is SAE30. When replenishing the gearbox after servicing, the correct amount of oil should be measured out and poured into the gearbox. Overfilling can lead to oil leaks from the gearbox due to pressurisation.

WARRANTY

1. WARRANTY AND LIABILITY

Use of the equipment

- 1.1 You must satisfy yourself as to the suitability of the equipment for your intended use(s) of the equipment.

Your relationship with the retailer

- 1.2 Where you consider you have a warranty claim (or any other claim) in relation to the equipment, you must contact the retailer who sold you the equipment, not C-Dax directly. The retailer is responsible for liaising with C-Dax in respect of your claim.

Warranty

- 1.3 C-Dax warrants to the original purchaser that the equipment is sold free from defects in materials and workmanship for a period of 12 months from date of first retail sale (6 months from date of first retail sale if the equipment is sold in the U.K.) subject to the terms set out below.

- 1.4 C-Dax will at its option repair or replace the defective equipment (or part of the equipment) or notify the retailer of the equipment to refund the purchase price for such defective equipment to you in the event of a breach of this warranty, subject to the terms set out below.

Liability

- 1.5 Except for the warranty set out in clause 1.2 above, all warranties and representations (including those expressed or implied by law) in respect of the equipment or advice relating to the equipment provided to you by C-Dax are excluded to the extent permitted by law.
- 1.6 Notwithstanding anything else in this manual, C-Dax's maximum liability to you (in the event that such liability exists) in respect of any breach of warranty, any matter set out in this manual, or for defective equipment or advice relating to the equipment provided is limited at C-Dax's option to:
- (a) repairing or replacing the equipment (or part of the equipment); or
 - (b) notifying the retailer of the equipment to refund the price for the equipment paid by you.
- 1.7 Notwithstanding anything else in this manual, in no event will C-Dax be liable, whether in contract, tort (including negligence) or otherwise:
- (a) where you have altered or modified the equipment, misused or misapplied the equipment, or the equipment has been subjected to any unusual, excessive or non-recommended use, service or handling (including as set out in this manual);
 - (b) where the equipment is not transported, stored, handled or used in accordance with any directions given by C-Dax (or the retailer) to you (including as set out in this manual);
 - (c) where the equipment:
 - (i) has been subject to neglect, accident or hireage, or the damage arises from fair wear and tear, battery damage or chemical attack;
 - (ii) has been built to a customer's specifications; or
 - (iii) has been dismantled, repaired or serviced other than by an authorised service agent of C-Dax;
 - (d) for loss or damage caused by any factors beyond C-Dax's control; or
 - (e) for any loss of profit or revenue, or for any special, indirect, incidental or consequential damage, loss or injury of any kind suffered by you.
- 1.8 Where C-Dax elects to repair or replace the equipment it will use reasonable endeavours to do so as soon as practicable but will not be liable for any delay in doing so.
- 1.9 You agree that the transactions entered into between you and the retailer (and C-Dax) are for the purposes of trade and that, having regard to all relevant circumstances of the transactions, it is fair and reasonable that the provisions of the Consumer Guarantees Act 1993 (NZ) do not apply to those transactions to the fullest extent permitted by law.

INSTALLATION & ASSEMBLY

Pre Delivery Check

Remove Shrink Wrap. Check Major Components for missing or damaged parts (remove any contents from inside tank before filling)

- Frame
- Tank
- Lid
- Filter
- Wheels & Axle (Trailed Only)

Assembly

- Connect spraying device (boom, hose reel, or hose and gun) to the sprayer following additional instructions if applicable.
- Connect the suction line from the filter to the outlet on the bottom of the tank (400L only)

Engine Driven pump:-

- Pump (Hose tails tight)
- Check spray pump oil level in pump sight glass ($\frac{1}{4}$ – $\frac{3}{4}$). Oil type SAE30 Anti Foam type
- Check engine oil level (fill to top of outer ring on filler neck). Oil type SAE 30
- Check engine fuel level
- Check spray pump accumulator pressure (0-2 bar boom spraying, 2-6 bar handgun spraying)
- Control unit and stand (clamps and hose tail tight) Gauge mount tight
- Suction filter (bowl tight)
- Put water in tank (50-100 litres)
- Ensure filter valve is open
- Ensure control unit pressure control is wound fully out (CCW) and dump valve set to 0 (dump position)
- Run pump at full rpm
- Ensure fluid flows in return line to tank and that there are no leaks
- Turn lever on to 1 (pressure position)
- Set Control unit pressure to 3 bar (45 psi) (See operating section for further control unit instructions)
- Open valve to boom (or handgun) and allow fluid to flow until all air is expelled from spray line.
- Ensure all nozzles spray evenly and there are no leaks
- Shut off control unit valve and ensure all nozzles stop spraying and do not drip
- If boom or hose reel is fitted, check mounting bolts for tightness

THEORY OF OPERATION

Spray fluid is placed in the tank where it is drawn through a suction filter and pumped to a control valve. The excess flow from the valve is returned to the tank via the bypass hose. Fluid at a nominal pressure is pumped to the spray outlet via the spray hose.

If a boom is fitted, when the pressure in the spray lines reaches 0.7 Bar (10 psi), the diaphragm check valves at each nozzle body open allowing fluid to reach the spray tips.

If a hose reel is fitted fluid will pressurise the reel until the spray gun is operated.

The control unit has a pressure adjustment valve to regulate the spraying pressure with a maximum pressure relief valve.

When the dump valve on the control unit is operated, the pump output is allowed to return to the tank with reduced restriction. The resulting drop in pressure allows the DCVs in the boom to close and spraying will stop.

At the spray tip, fluid is atomized at the spraying pressure and the fluid is propelled toward the target at the tip angle.

Droplet size is controlled by the spraying pressure.

Application rate is controlled by tip size, and vehicle speed.

CALIBRATING YOUR PRESSURE NOZZLE BOOM

Metric Version (litres, metres, kph)
(*Standard nozzle spacing 0.5 metres)

You will need to calibrate your sprayer to ensure the accurate application of chemical or liquid fertilizer. If too much chemical or liquid fertilizer is applied you will be wasting money! If too little is applied you may need to repeat the spraying, which will be wasting your money and time!

Chemicals are expensive. Repeat calibration frequently during the seasons to avoid disappointment.

To calibrate your sprayer you will need:

- a) nozzle calibrator or an accurate measuring flask
- b) watch or clock with seconds, or a stopwatch
- c) tape-measure
- d) calculator

NOTE: "Chemical" also refers to liquid fertilizers.

1. Measure time taken to travel 100m at the speed used for spraying

NOTE:
Maximum Recommended Spraying Speed is 12 Kph.

2. Run Sprayer and record output from each nozzle (in mls) for the same time it took to travel 100m.

Calculate average flow per nozzle.

ie. Add individual nozzle output and divide by number of nozzles.

NOTE:
Check any nozzle tip that is out by $\pm 5\%$
Discard any nozzle tip that is out by $\pm 10\%$

3. Litres/ha = $\frac{\text{Average Nozzle output (ml/nozzle)}}{500 \text{ nozzle spacing (mm)}} \times 100$

4. Chemical to add to tank

Litres of Chemical = $\frac{\text{Water in Tank (L)}}{\text{L/ha (application Rate)}} \times \text{Label chemical rate/ha}$

HINT: If you want to spray one hectare, but a tank load covers two, then simply put in half the amount of chemical and water in the tank. Similarly if you want to spray half a hectare and a tank load covers two, then quarter the amount of chemical and water in the tank, and so on.

Spray Tip Calibration Table

Tip Ref Code	Pressure Bar	Flow L/min	6kph	8kph	10kph	12kph	14kph	16kph	18kph
110-SF-01 Orange	2.0	0.33	66	50	40	33	28	25	22
	2.5	0.37	74	56	44	37	32	28	25
	3.0	0.40	80	60	48	40	34	30	27
	3.5	0.43	86	65	52	43	37	32	29
	4.0	0.46	92	69	55	46	39	35	31
110-SF-015 Green	2.0	0.49	98	74	59	49	42	37	33
	2.5	0.55	110	83	66	55	47	41	37
	3.0	0.60	120	90	72	60	51	45	40
	3.5	0.65	130	98	78	65	56	49	43
	4.0	0.69	138	104	83	69	59	52	46
110-SF-02 Yellow	2.0	0.65	130	98	78	65	56	49	43
	2.5	0.73	146	110	88	73	63	55	49
	3.0	0.80	160	120	96	80	69	60	53
	3.5	0.86	172	129	103	86	74	65	57
	4.0	0.92	184	138	110	92	79	69	61
110-SF-03 Blue	2.0	0.98	196	147	118	98	84	74	65
	2.5	1.10	220	165	132	110	94	83	73
	3.0	1.20	240	180	144	120	103	90	80
	3.5	1.30	260	195	156	130	111	98	87
	4.0	1.39	278	209	167	139	119	104	93
110-SF-04 Red	2.0	1.31	262	197	157	131	112	98	87
	2.5	1.46	292	219	175	146	125	110	97
	3.0	1.60	320	240	192	160	137	120	107
	3.5	1.73	346	260	208	173	148	130	115
	4.0	1.85	370	278	222	185	159	139	123
110-SF-05 Brown	2.0	1.63	326	245	196	163	140	122	109
	2.5	1.83	366	275	220	183	157	137	122
	3.0	2.0	400	300	240	200	171	150	133
	3.5	2.16	432	324	259	216	185	162	144
	4.0	2.31	462	347	277	231	198	173	154
110-SF-06 Grey	2.0	1.96	392	294	235	196	168	147	131
	2.5	2.20	440	330	264	220	189	165	147
	3.0	2.40	480	360	288	240	206	180	160
	3.5	2.60	520	390	312	260	223	195	173
	4.0	2.80	560	420	336	280	240	210	187
110-SF-08 White	2.0	2.61	522	392	313	261	224	196	174
	2.5	2.92	584	438	350	292	250	219	195
	3.0	3.20	640	480	384	320	274	240	213
	3.5	3.46	692	519	415	346	297	259	231
	4.0	3.70	740	555	444	370	317	277	247

Nozzle Tip Selection

Select desired nozzle flow/minute from chart • multiply by the number of nozzles. • equals total flow in litres/minute for whole boom (This should not exceed 2/3 of pump capacity for engine & PTO driven pumps).

OPERATION

Hand Gun Spraying

- Add chemical mix into the tank at spraying rates recommended on chemical container
- Ensure control unit pressure control knob is wound fully out (CCW) and dump valve set to 0 (dump position) (engine driven models only)
- Run pump at full engine rpm
- Ensure fluid flows in return line to tank (engine driven models only)
- Turn dump valve lever on control unit to I (pressure position)
- Set Control unit pressure to required handgun setting.

WARNING

To prevent damage to pump and control unit, do not exceed recommended maximum rated pressure on the spraying components.

- Open valve to hand gun, and allow fluid to flow until all air is expelled from spray line
- When spraying has finished, turn dump valve lever on control unit to 0 (dump position), and control unit pressure control is wound fully out (CCW)
- Proceed with rinsing procedures

WARNING

To prevent premature failure of Imovilli spray pump diaphragms, pump speed **MUST BE** set between 400 and 550 RPM during operation. For engine driven equipment, operate at full engine RPM.

Pressure Nozzle Boom Spraying

Spray booms that require a bypass to divert fluid back to the tank, such as the CDA booms, are supplied with a bypass fitting to screw into the rear of the sprayer tank.

- Add chemical mix into the tank at **pressure nozzle** spraying rates recommended on chemical container
- Ensure control unit pressure control knob is wound fully out (CCW) and dump valve set to 0 (dump position) (engine driven models only)
- Run pump at full rpm
- Ensure fluid flows in return line to tank (engine driven models only)
- Turn dump valve lever on control unit to I (pressure position)
- Set Control unit pressure to required pressure setting (nominally 1-4 Bar (15-60psi)).

WARNING

To prevent damage to pump and control unit, do not exceed the recommended maximum rated pressure on the spraying components.

CAUTION

To allow the spraying system to operate effectively, any engine driven spraying device should not exceed 2/3 of the maximum flow of the spray pump.
Example: 2.5 L/min x 12 nozzles = 30 L/min. 30 litres is more than 2/3 the capacity of the M35 pump so an M50 would be required, or the nozzle flow reduced.
12 Volt equipment can safely utilise the full flow of the spray pump.

- Open valve/s to boom, and allow fluid to flow until all air is expelled from spray lines
- When spraying has finished, turn dump valve lever on control unit to 0 (dump position), and control unit pressure control is wound fully out (CCW)
- Proceed with rinsing procedures

CAUTION

To prevent premature damage to sprayer or spraying components, do not travel at excessive speeds while spraying. Spraying speeds must be matched to ground conditions. If ground is uneven or rough, **REDUCE SPEED.**

WARNING

To prevent premature failure of engine driven pump diaphragms, pump speed **MUST BE** set between 400 and 550 RPM during operation. For engine driven equipment, operate at full engine RPM.

ROUTINE MAINTENANCE

Filters

There are two filters in each sprayer fluid system. Each one must be checked and cleaned after each use. The tank strainer basket is retained by the lid to assist cleaning. Always clean the strainer before filling the tank with spray solution.

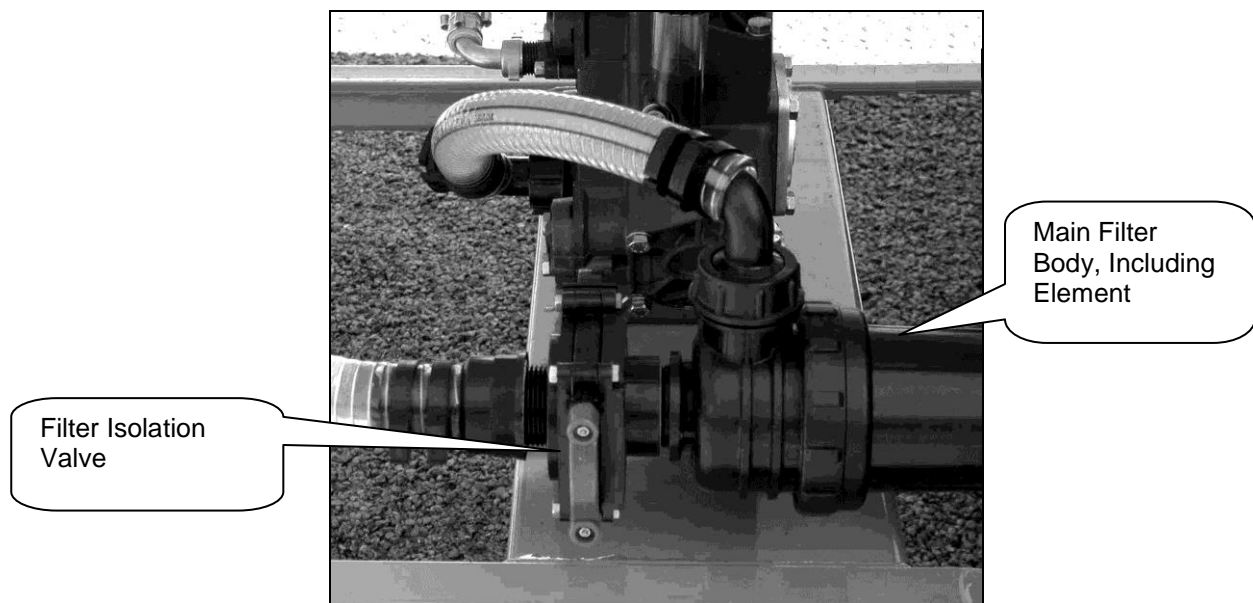
The suction filter is located between the tank outlet and the pump inlet. Carefully rinse each stainless steel mesh with a hose.

Engine Driven Models

400L engine driven model sprayers are fitted with an isolation valve to isolate the filter from the fluid in the main tank. To isolate the filter for cleaning, pull the red handle out on the knife valve to shut off tank flow and remove filter bowl and element.

When the filter bowl and element has been cleaned, refit and tighten the bowl nut and push in the knife valve handle.

200L units do not feature an isolation valve as the suction line is above the tank. To clean the filter on 200L units simply remove the filter bowl with the spray unit not running.



CLEANING

At the end of spraying, flush the system three times with fresh water. Include the spraying device/s and spray pump in this operation. Drain tank using drain bung.

Remove the strainer basket under the lid of the sprayer, rinse and refit.

Isolate filter using gate valve (400L only).

Remove the main filter element, clean and refit, ensuring that the filter bowl O-ring is in place, and the bowl nut is tight. Replace element if damaged or unable to be cleaned.

Clean the outside of the sprayer to remove any spray residue.

Lubricate the control unit levers

Remove and clean spray tips and nozzle filters on spray boom (if fitted).

Routinely

- Check calibration of sprayer and boom (if fitted).
- Lubricate any moving boom or accessory parts.
- Check spray hoses for kinks or damage, replace if necessary.
- Check pump accumulator pressure (for engine driven units)
- Check the oil level and condition in the spray pump. (for engine driven units)

Annually or End of Season

- Replace oil in Imovilli diaphragm spray pump (or after 200 hours, whichever comes first). Use SAE 30 antifoam oil
- Replace nozzles on spray boom
- Flush tank sprayer completely. Only water to be left in the system.

WARNING

To prevent premature failure of spray pump, **DO NOT** leave water in the sprayer tank or pump when there is a risk of frost.

- Remove filters and check. Reassemble filters.
- Clean sprayer thoroughly and carefully. Apply CRC or other corrosion preventative to all electrical connections.
- Check pump for leaks and poor performance. If pump requires service have it done immediately. Any delay may result in very costly repairs.
- Unscrew regulator pressure adjustment stem 5 to 10 turns (engine driven models only).
- Have motors serviced if not operating satisfactorily. Motor spare parts are available from In-Ex.
- Repair all faults – see “Trouble Shooting”.

Engine Driven Spray Units Pump Trouble Shooting

- If pressure has to be regularly adjusted, check for air leaks in suction lines (Filters without “o-ring etc). **DON'T FORGET TO ADJUST PRESSURE DOWN WHEN NEXT FILLING OR PUMP WILL BE DAMAGED.**
- Pump does not Prime – Check that the suction hose packing is in good condition, that there is no air leaks in the suction hose and that the suction filter is not clogged.
- Irregular running of the pump – Clean valves of foreign particles and if necessary replace worn or damaged valves.
- Pump runs but lacks pressure – This depends on the regulating valve sealing or from the obstruction of the delivery valve by foreign particles or wear. Replace the regulating valve and clean and if necessary replace the delivery valve.
- Irregular delivery of water – (vibration of delivery pipe and pressure gauge) – check the seal on the suction hose and that the pressure of the air in the accumulator reaches the advised figure.
- Pump level leaks oil - Oil level too high. The leakage of oil mixed with water (whitish or thick) means the breakage of a diaphragm. In this case, stop the pump immediately, empty and drain it completely, wash inside with diesel oil to prevent oxidation of internal parts and replace diaphragm. After this operation it is necessary to expel the air bubbles formed between the piston and the diaphragm.

IMOVILLI Gearbox Oil Levels

The correct oil quantity for the reduction gearbox between the motor and pump is 180ml. The correct oil is SAE30. When replenishing the gearbox after servicing, the correct amount of oil should be measured out and poured into the gearbox. Overfilling can lead to oil leaks from the gearbox due to pressurisation.

Pump Features Imovilli M35/M50

Points to note;

Accumulator Diaphragm

- Under the Red Dome
- Pressure = 40% operating pressure
- Evens out pulsing of pump outlet

End Diaphragms

- Located in end caps
- Bolts **MUST BE KEPT TIGHT** to prevent cracking of the housing. If they keep coming loose, check PTO shaft balance.
- Diaphragm is fitted edge in and writing out. Cylinder heads must be tight.
- If fluid is outside the diaphragm the damage is probably a mechanical problem e.g. PTO speed too low or failed or worn pistons rings (located under sleeve under end plate diaphragm).
- Hydraulic diaphragm pump – There is no contact between piston and diaphragm because cavity fills with oil.

Cylinder Head (End Plate)

- Suction diaphragm reduces “hammering” in pump.
- Pump contains four valves (two each side)
- Valves on PTO side are inlet (cap uppermost)
- Valves on pressure side are outlet (spring uppermost)
- Valve housings have “O”-rings
- Check for wear on stainless steel surfaces
- Check for wear on springs
- If either worn, replace valve assembly

Simple Rules for Dismantling and Re-Assembling Imovilli Pumps

Point 1

Before completely dismantling the pump, check that the causes for irregular running or non-function are not amongst those indicated in the maintenance and instructions booklet supplied with each pump.

Point 2

To substitute diaphragms or internal moving parts, dismantle in the following order:

- A) Suction manifold(s) (according to the type of pump)
- B) Heads
- C) Diaphragms
- D) Cylinders
- E) Pump shaft and then all the moving parts

The exploded drawing in the instructions booklet and spare parts catalogue should be of assistance.

Point 3

Carefully wash all the components with diesel oil, blow clean with compressed air, and then inspect all the parts:

- A) Diaphragms: By inspecting the diaphragm damage one can determine the type of problem.

If the diaphragm has a cut (on the oil side) of the same diameter as the piston, the pump has been running at a speed of less than 250-300 rpm.
Whenever there is a diaphragm failure on the oil side, with a circular rupture corresponding to the size of the piston, one should always check that the piston/cylinder are not scored or worn. Otherwise, if this is the case, the new diaphragms would have a very short life since

the oil will not remain between the piston and diaphragm and the latter will work only mechanically (without hydraulic support).

If there is a circular or semi-circular cut on the center/outside of the diaphragm on the liquid side, the pump has worked under a vacuum due to: Blocked suction Equipment, - "soft " suction tubes which flatten during operation, - under dimensioned filter equipment, or a dirty filter.

All these result in too much oil gathering between the piston and the diaphragm, which causes the diaphragm to literally burst.

Diaphragms can be damaged also if the client will not release pressure when stopping/starting the pump.

N.B. The use of particularly corrosive or concentrated products can also alter the diaphragm structure causing swelling of the part in contact with the liquid and increasing the likelihood of failure.

- B) Cylinders: These should have no lines from the oil supply holes outwards (flange). If they do they should be replaced.
- C) Connecting Rods: There should be no excessive play between connecting rods/bearings and the connecting rods and their coupling rings. To check this, position shaft in a vice and mount bearings, connecting rods and rings. The play should not exceed 0,2-0,3mm.
- D) Crank Shaft: The shaft should have no lines or wear on the part where the connecting rods work.
- E) Shaft Seal Bearings: Premature and repeated impute shaft oil seal failure. If the seat and the shaft are not scored or worn and tolerances are ok (if not pump will leak also when sitting) the only reason beside normal wear of the seal (increased in dusty conditions) can be damage on the seal itself when placed into position. The keyway has very sharp edges and much attention should be given to this operation. It is always advisable to protect the seal with a thin pipe.
- F) Bearings: The bearings should be rust-free and have no excessive play. Check that the rollers and balls in the bearings are in perfect condition.
- G) Pistons: Replace the piston skirt if it is lined, especially on a low-pressure pump, which has no piston rings. Check that play on the piston pins is not excessive.
- H) Piston Rings: On the pumps equipped with these rings check that they have no marks or breakages. If necessary, replace.
- I) Check Valves: Carefully check the cage. If cracked or very worn on the fins, replace. The seats are suitable, even if worn, provided that the working surface (where the cap beats) has no cuts or deformations. The same applies to the valves. The springs should not be worn. It is preferable to change the whole valve assembly.

N.B. Excessive wear on the check valves on a pump which has only worked a few hours could be caused by the pump running at a higher speed than the maximum allowed (550 rpm) or by the presence of sand or other abrasive substances in the liquid pumped.

- J) Pressure Accumulator: It is always advisable to check the wear on the lower accumulator diaphragm and replace it if necessary. Inflate according to the working pressure as specified below:

Pump Pressure In Bars	Air Pressure in Bars
0 – 5	0 – 2
5 – 15	2 – 6
15 – 20	6 – 8

- K) When dismantling a pump, which has been working, it is advisable to replace the 'O' rings gaskets and seals in general to avoid the risk of having to check everything again.

Point 4

To reassemble proceed as when dismantling but in reverse, bearing in mind the following:

- A) All the shoulder rings should be mounted with the bevel in correspondence with the shaft shoulder.
- B) On pumps with piston rings, these should be positioned on the piston with the gaskets diametrically opposite
- C) The cylinders should be re-mounted with at least 4 oil supply holes in the direction of the shaft rotation to assist air drainage, checking that the piston ring joints are not on line with the cylinder holes.
- D) The check valve must be positioned correctly. Looking at the suction manifold can help. The valve near the suction manifold must allow the liquid to enter the head; consequently the delivery valves should be mounted the other way up.

NOTE:

If all valves are mounted (by mistake) in the suction direction the pump will explode on starting. If mounted in the delivery direction, the pump will not be able to suck.

- E) Before re-mounting the heads, make sure that the moving parts turn freely. If they are stiff or tight, check the assembly of the moving parts to ensure that this has been carried out correctly. One can then proceed with assembling the heads.
- F) It is a good idea to remember that a plastic hammer can be useful in both dismantling and re-assembling the pump, but it should always be used with care.
- G) After completing assembly, fill with oil to the maximum tank capacity.
DO NOT REPLACE STOPPER.
- H) Expel Air as follows:

Turn the pump shaft slowly by hand keeping it inclined with respect to the transversal shaft. Bubbles of air will rise to the surface in the oil tank and the level will fall. Keep the oil level topped up so that air does not enter the pump. Continue for a few minutes until no more air bubbles are expelled from the tank. Top up the oil level to between $\frac{1}{4}$ and $\frac{3}{4}$ of the sight glass, then replace the oil stopper.
- I) To eliminate any further air trapped between the piston and the diaphragm, loosen the oil tank stopper, run the pump at 200-300 rpm for a few minutes without pressure. Check the oil level again and after screwing the stopper shut the pump can work normally.

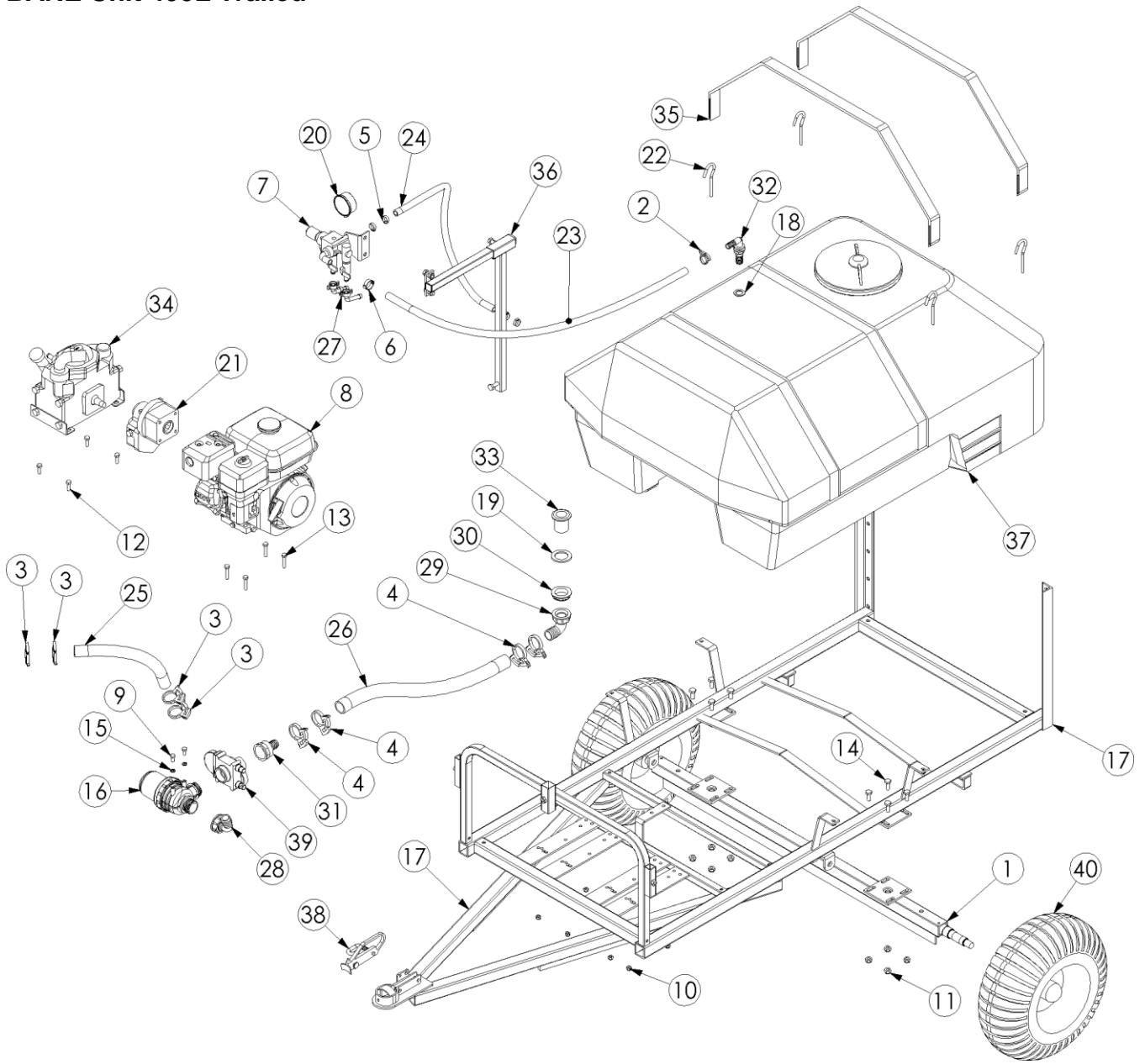
CAUTION

To allow the spraying system to operate effectively, any spraying device should not exceed $\frac{2}{3}$ of the maximum flow of the spray pump (engine driven or PTO pumps only).

Example: 2.5 L/min x 12 nozzles = 30 L/min. 30 litres is more than $\frac{2}{3}$ the capacity of the M35 pump so an M50 would be required, or the nozzle flow reduced.

PARTS DIAGRAMS

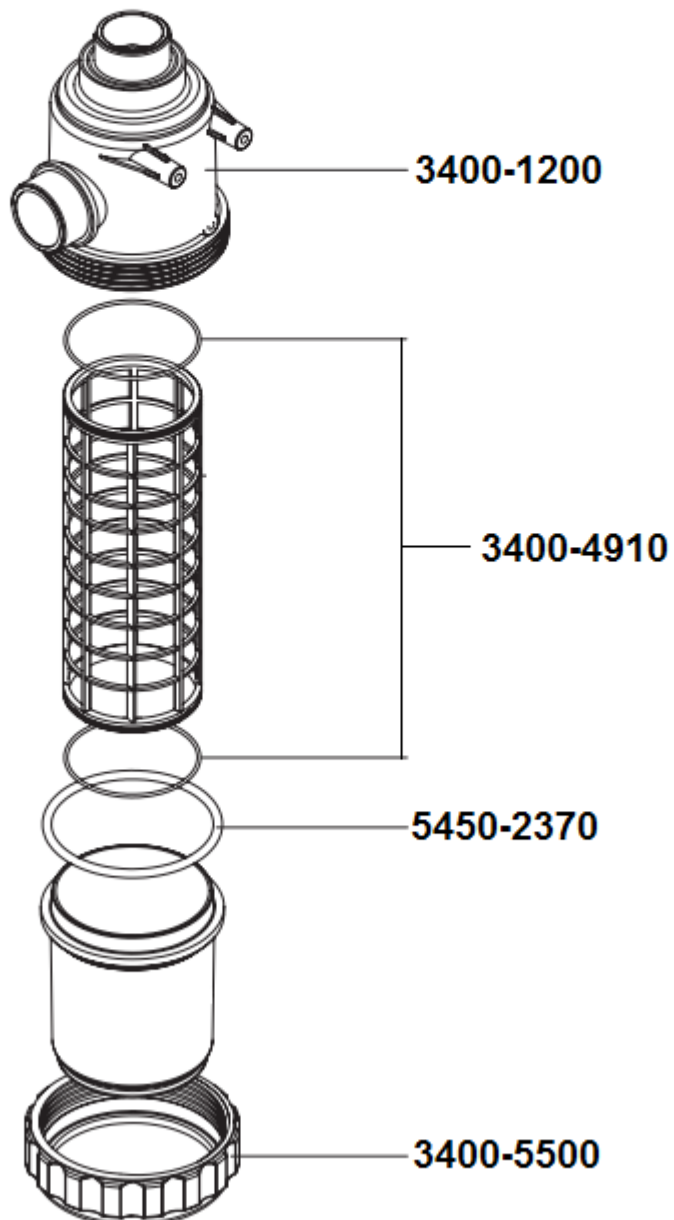
BARE Unit 400L Trailed



Parts List BARE Unit 400L Trailed Unit

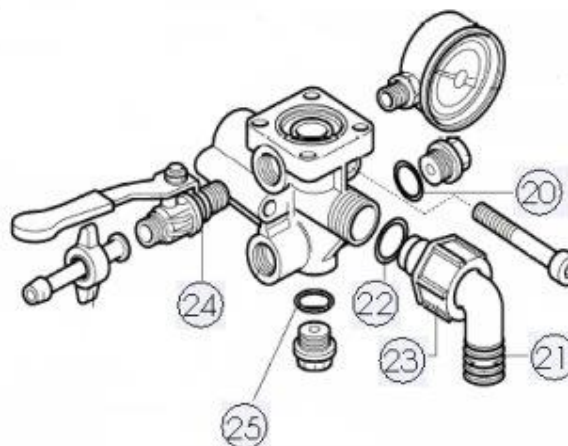
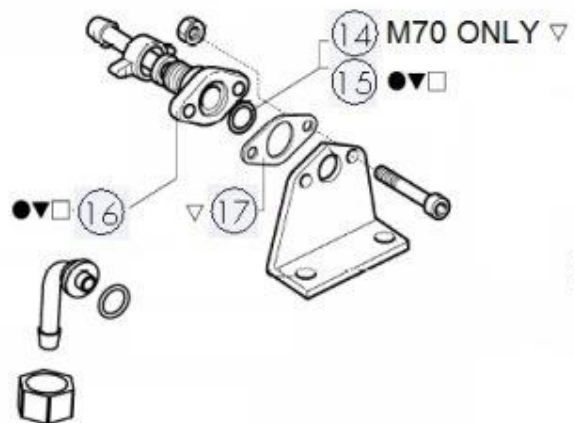
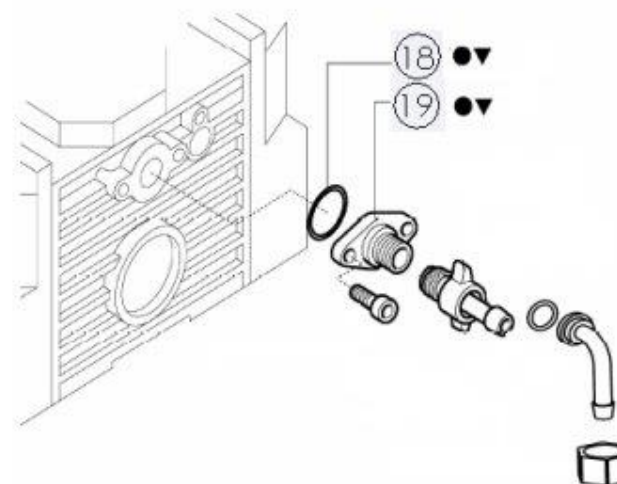
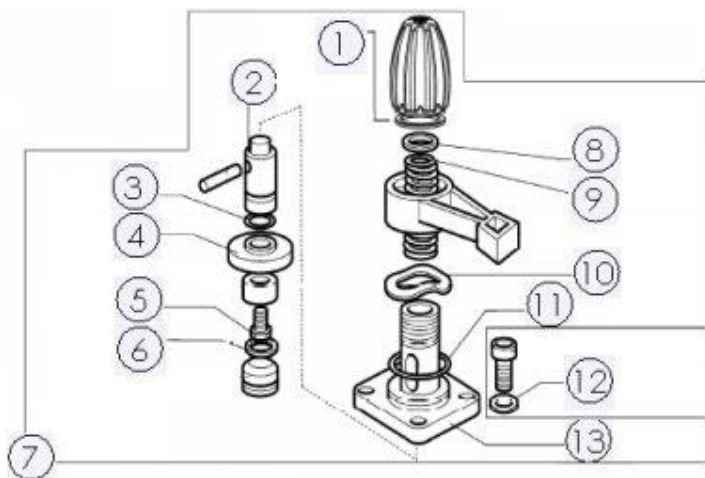
Item No.	QTY.	e9 part no	e9 description
1	1	1082-4384	Axle-In-Ex 400T-GL
2	1	2000-0020	Clamp-Hose-Herbi-J-Ratchet-20.3<>23.0mm-Black-Nylon
3	4	2000-0032	Clamp-Hose-Herbi-P-Ratchet-32.0<>34.8mm-Black-Nylon
4	4	2000-0038	Clamp-Hose-Herbi-R-Ratchet-38.0<>41.0mm-Black-Nylon
5	6	2000-2019	Clamp-Hose-Oetiker-Single Ear Stepless-19.4<>22.6mm-S/S
6	1	2000-3023	Clamp-Hose-Oetiker-Two Ear-23.0<>27.0mm-ZP
7	1	2220-0700	Controller-Imovilli-CD6/2 Port-50 Bar 70L-No Gauge
8	1	2670-0040	Engine-Honda-4HP-Horizontal Shaft
9	2	2840-0816	Fastener-Bolt&Nut-Hex-8.8 Grade-M8x16-ZP
10	14	3170-0008	Fastener-Nut-Nyloc-M8-ZP
11	8	3170-0010	Fastener-Nut-Nyloc-M10-ZP
12	4	3290-0825	Fastener-Set Screw-Hex-8.8 Grade-M8x25-ZP
13	4	3290-0840	Fastener-Set Screw-Hex-8.8 Grade-M8x40-ZP
14	8	3290-1025	Fastener-Set Screw-Hex-8.8 Grade-M10x25-ZP
15	2	3330-8008	Fastener-Washer-Spring-M8-ZP
16	1	3400-8360	Filter-Suction-Complete-1 1/4BSPF-50 Mesh-312-Black-Nylon
17	1	3500-6800	Frame-Trailed-SO500 Engine Driven-GL
18	1	3700-9140	Gasket-Washer-21x33x2-Rubber
19	1	3700-9190	Gasket-Washer-40x60x4-Rubber
20	1	3750-5000	Gauge-75mm-Bottom Mount-580PSI-40Bar-1/4BSPF-G/Filled
21	1	3800-4100	Gearbox-Imovilli-Reduction-6.55:1
22	4	4085-1010	Hook-Bolt-Threaded-M8-Slimline-ZPG
23	1	4090-0016	Hose-By Pass-Cross Braided-16mm ID-17 Bar-Clear Plastic
24	1	4100-0013	Hose-Spray-Delivery-40 Bar-13mm ID-Yellow
25	1	4100-3025	Hose-Suction-Wire Reinforced-25mm ID-Clear Plastic
26	1	4100-3032	Hose-Suction-Wire Reinforced-32mm ID-Clear Plastic
27	2	6200-1610	Pipe-Fitting-Connector-Elbow-13 Shank-Incl 1/2BSPF Fly Nut-Brass
28	1	6200-2550	Pipe-Fitting-Elbow-25 Shankx1 1/4BSPM-Nylon
29	1	6200-2580	Pipe-Fitting-Elbow-33 Shank-Incl 1 1/4BSPF Fly Nut-Nylon
30	1	6200-5460	Pipe-Fitting-Nut-Back-1 1/4BSP-Plastic
31	1	6200-8515	pe-Fitting-Straight-32 Shank-Incl 1 1/4BSPF Fly Nut-Plastic
32	1	6200-9420	Pipe-Fitting-Thru Tank-Elbow-16x16 Shankx1/2BSPM-Plastic
33	1	6200-9450	Pipe-Fitting-Thru Tank-Straight-1 1/4BSPM-Nylon
34	1	6800-7700	Pump-Imovilli-M35B-Bare
35	2	8410-9104	Strap-Web Sling-1200 Long-38mm-900KG-Reduced and Reversed-KS1 Material-Black
36	1	8427-1000	Sub-Attachment Kit-CD6-In-Ex 3PL
37	1	8427-8412	Sub-Tank Plumbed-In-Ex 400L Flat Deck/Trailed-Natural
38	1	8800-3800	Tow-Coupling-Handle-Double Ended-1 78 x 50mm-ZP
39	1	8900-4490	Valve-Knife-Sliding-1 1/4BSPMx1 1/4BSPF-Nylon
40	2	9200-4556	Wheel-Knobby Turf-Bearing-22x12x8-4 Ply-CLAW

FILTER SPARE PARTS



CONTROLLER SPARE PARTS

- M30
- ▼ M50
- M60
- ▽ M73



imovilli pompe

COMANDO C6 - VERSIONE COMANDO A DISTANZA

Parts List

Item No.	Description	Part No.	QTY	Unit
1	ORing-Imperial-3/32"x1"-N70	5450-4620	1	EA
2	Piston-Imovilli-Controller-CD10	6220-4320	1	EA
3	ORing-Imperial-3/32"x7/16"-N70	5450-4560	1	EA
4	Diaphragm-Imovilli-Regulator-CD6;CD10	2300-4350	1	EA
5	Fastener-Imovilli-Cap Head-Allen Screw-M4x12-Stainless	3040-0412	1	EA
6	ORing-Imperial-3/32"x7/16"-N70	5450-4560	1	EA
7	Valve-Imovilli-Controller-Pressure/On Off-Top Assy-CD6	8900-4380	1	EA
8	Washer-Imovilli-Chamfered-CD10	9100-4300	1	EA
9	Spring-Imovilli-Pressure Control-CD10	8250-4300	1	EA
10	Ring-D-26.5 x 31.7 x .40mm	7300-2000	1	EA
11	ORing-Imperial-1/16"x1 1/16"-N70	5450-1100	1	EA
12	Washer-Imovilli-Flat-6592	9100-4350	1	EA
13	Body-Imovilli-Valve-M30;M50;CD10	1200-4250	1	EA
14	O'Ring-Imperial-3/32"x13/16"-N70	5450-4590	1	EA
15	ORing-Imperial-3/32"x3/4"-N70	5450-4580	1	EA
16	Flange-Imovilli-Outlet-2 Bolt x 1/2"BSPM-M30,M50	3415-4200	1	EA
17	Gasket-Imovilli-Valve-Pressure Relief-M30;M50-Paper	3700-3830	1	EA
18	ORing-Imperial-3/32"x3/4"-N70	5450-4580	1	EA
19	Flange-Imovilli-Outlet-2 Bolt x 1/2"BSPM-M30,M50	3415-4200	1	EA
20	Gasket-Imovilli-Gearbox-22x16mm-M29;M30;M35-Paper	3700-3700	1	EA
21	Pipe-Fitting-Imovilli-Elbow-18 Shank-Swivel-18mm-Plastic	6200-4200	1	EA
22	ORing-Imperial-1/16"x11/16"-N70-Hobby	5450-1040	1	EA
23	Pipe-Fitting-Imovilli-Nut-Swivel-3/4"-Plastic	6200-4250	1	EA
24	Valve-Imovilli-Ball-3/8BSPMx1/2BSPM-SX-Brass	8900-4320	1	EA
25	Gasket-Imovilli-Gearbox-22x16mm-M29;M30;M35-Paper	3700-3700	1	EA

EQUIPMENT DECONTAMINATION PROCEDURES

All application equipment should be regularly washed, decontaminated and cleaned both internally and externally whilst involved in routine operations, at least at the completion of each days work, and whenever a change of agrichemical mix occurs. The easiest way to reduce the hazards of contaminated equipment is to dilute pesticides with copious amounts of water, being careful to dispose of the rinsing in an approved manner. Decontamination should preferably be carried out on a concrete loading pad, which is correctly drained and ensure proper disposal of chemical wastes. If decontamination has to be carried out in the field, a safe area should be selected which will not be grazed by stock and will not drain into waterways, other crop sites or residential areas.

Most agrichemicals are subject to degradation in the presence of an alkaline or acid medium. Decontamination requirements vary with chemical types, however the following recommendations are presented as guidelines. If in doubt or if further information is required, manufacturers should be consulted.

ORGANOPHOSPHATES: Clean with a solution of washing soda and sodium hypochlorite, followed by a double water rinse.

CARBAMATES: Use a solution of washing soda and detergent followed by a double water rinse.

PHENOXY HERBICIDES: Phenoxy herbicides present special cleaning problems. This class of chemicals cannot be removed from a spray system using conventional methods and it is a group that is used widely in agriculture. If a fungicide or insecticide application has to be carried out after use of 2, 4-D or MCPB etc the following methods are suggested for decontaminating the spray system. Complete decontamination is generally considered impossible for this class of chemicals and great care must be taken. **The following procedure is not a guarantee of obtaining a herbicide free spray system.**

SALTS (AMINE AND METAL) AND OTHER WATER SOLUBLE FORMULATIONS:

Rubber hoses, nozzle diaphragms and seals may have to be renewed since they can retain chemical deposits. Add 5g of washing soda to each 10 litres of water and discharge through the nozzles. Double rinse the system with water.

B) ULV FORMULATIONS: Before using oil based formulations, it is important to remove any traces of water by flushing with diesel fuel. Likewise when reverting to water based sprays, the system should be cleaned with diesel fuel followed by a water based detergent rinse and water rinse.

C) SULPHONYLUREA HERBICIDES: It is generally possible to remove traces of these chemicals from a spray system provided the following method of cleaning is used. The procedure is listed according to data supplied by Du Pont.

Procedure:

- 1- Drain system and flush tank, boom and hoses with clean water for a minimum of 10 minutes.
- 2- Fill the tank with clean water and add 300ml of household chlorine bleach (containing 3 % sodium hypochlorite) per 100L of water. Flush through the spray boom and nozzles and allow to sit for 15 minutes. Drain system.
- 3- Repeat Step 2.
- 4- Nozzles and screens should be removed and cleaned separately. To remove traces of chlorine bleach rinse the tank thoroughly with clean water and flush through hoses and boom.

NB: For phenoxy herbicides, washing soda is the preferred cleaning agent since it helps to lift the offending agent off the surfaces of the spray system. For Sulfonylurea herbicides, however, sodium hypochlorite is the preferred cleaning agent because it reacts with the sulfonylurea, causing it to be broken down into compounds with no herbicidal activity. The process occurs relatively quickly, (10 – 15 minutes) but is done twice to ensure complete deactivation of the sulfonylurea.

The products should be used as stated above. Under NO circumstances should washing soda be mixed with chlorine bleach. Mixing releases a dangerous gas.

Refer to the Agrichemical Manual for additional information.