

USER MANUAL

Acid applicator Spreader 4000 & Spreader 6000



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Eu Declaration of conformity

Happowa Oy
Kankaantie 563, 62150 Ylihärmä

We declare under our sole responsibility that the acid applicators **Spreader 4000** and **Spreader 6000** starting from production number 3200 are in conformity with the relevant Union legislation Machinery Directive 2006/42/EC.

These products are also in conformity with the relevant safety requirements of the following directives:

Directive 89/392/EEC

Directive 91/368/EEC

Directive 93/44/EEC

Directive 93/68/EEC

The following standards have also been considered in designing the products, as applicable:

EN 292-1

EN 292-2

EN 294


EN 349

EN 811

EN 1152

SFS 5091

In Ylihärmä 4.1.2019


Johannes Holkkola, managing director

1. Safety

Spreader acid applicators are primarily intended for pumping and dosing fluid agricultural preservatives in silage production. The pump feeds the preservative to the nozzles through the hoses and the preservative is mixed to the fodder by the nozzles.

The acid applicator can also be used as a transfer pump, in which case the pump feeds the preservative straight to another container through the hose.

1.1 General safety instructions

- In addition to the instructions given in the manual, you must obey all the general safety rules concerning mechanical working.
- Before using the applicator, make sure that the device has been connected correctly and that covers are at place.
- Before using the applicator, make sure that all the hoses, couplings and nozzles connected to the system are suited for the preservatives used.
- All operating personnel must be familiar with the operating functions and the manual of this machine.
- Keep children and unauthorised people away while using, assembling or maintaining the machine.
- Always stop the tractor prior to maintenance or repairs. Apply the parking brake, remove the ignition key and disconnect the dosing machine before leaving the cab.
- Keep the rear window of the tractor closed while using the acid applicator.

- Always keep enough clean rinse water on hand.
- Pump a large amount of clean water through the system before maintenance. Always handle acids with caution. Always use acceptable personal protective equipment.
- Inspect the condition of the hoses and the couplings regularly. Replace any damaged parts with new ones immediately. Notice that even a small detrition or corrosion may cause danger.

1.2 Handling of acids

- Familiarise yourself with the safety and handling instructions of the preservative manufacturers.
- Always handle the acid applicator with caution and use appropriate personal protective equipment.
- Only use the acid applicator outdoors or in spaces with adequate ventilation.
- An acid applicator that has not been cleaned can only be placed on a surface that is acid resistant.

1.3 Personal protection

- Use an appropriate respirator if ventilation is inadequate.
- Use tight-fitting safety goggles to protect your eyes and keep clean water in a bottle for rinsing out eyes.
- Use protective clothing or an apron of a sufficient size and boots to protect from any splashing.
- Use neoprene or PVC gloves to protect hands.

1.4 First aid instructions

- Inhalation of acid fumes: move to fresh air, keep warm and calm. Consult a doctor if necessary.
- Acid splashing on skin: rinse splashes from the skin immediately using plenty of water and take off stained clothes.
- Acid exposure to eyes: rinse eyes immediately with plenty of water, also under the eyelids. Consult a doctor.
- If acid gets into mouth: rinse your mouth immediately with plenty of water. A few glasses of water may be drunk. Consult a doctor if necessary.

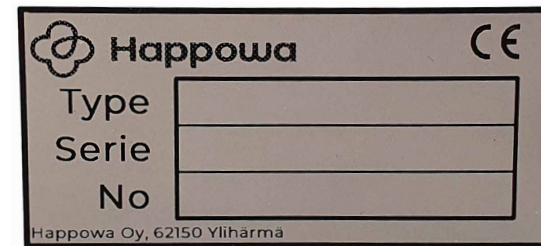
1.5 Restrictions on use

- The operator of the acid applicator must not be under the influence of narcotics, alcohol or powerful medications.
- In case of illness or disablement, the operation of the machine must be authorized by the attending physician.
- The acid applicator must not be used dry.
- Pumping inflammable liquids, liquids for human consumption, or additives is forbidden.
- Do not pump acid that has been diluted with water unless specifically permitted by the manufacturer.

2. Technical specifications

You can find the identity information of the machine in the machine plate shown in the picture below. With this information it is easier to maintain the product and order spare parts.

Type the information of your machine to the pattern below to be able to find it easily.

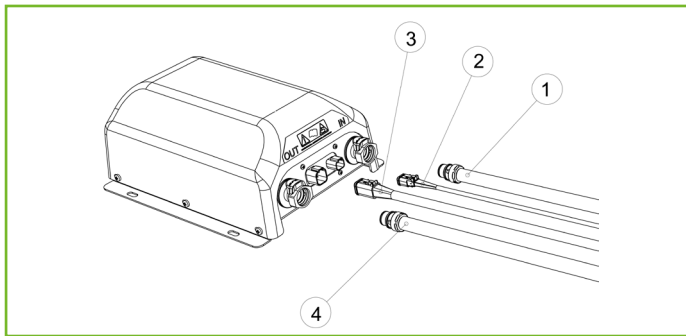


	Spreader 4000	Spreader 6000
Operating voltage	12 V	12 V
Max. required current	7 A	13 A
Max. pressure	3 bar	3 bar
Max. pumping capacity	6 l/min	12 l/min
Weight	3,1 kg	3,1 kg

3. Assembly

3.1 Pump connection

The pump unit should be mounted as near the tank as possible. This improves the functions of the pump especially with a tank that is not full and after filling it up. The pump unit can be mounted either horizontally or vertically (couplings downwards only).



Mount the pump unit firmly with four hex head screws to a suitable place where it is not exposed to unnecessary vibration.

Connect the suction hose (1), limit switch (2, additional equipment), power cable (3) and pressure hose (4) to the analogous couplings of the pump. Make sure that the quick couplings of the hoses are locked, and the couplings of the power cables are firmly attached.

⚠ MAKE SURE THAT ALL THE HOSES, COUPLINGS AND NOZZLES CONNECTED TO THE SYSTEM ARE SUITED FOR THE PRESERVATIVE USED.

⚠ DO NOT USE THE PUMP DRY

3.2 Connecting cable

The sequence of the pins of the cable connecting the pump to the controller:

1. Motor + 12 V
2. +10 V to the sensor
3. Flow meter signal
4. Limit switch signal
5. Sensor 0 V
6. Motor –

3.3 Controller connection

Mount the controller securely into the cabin so that it is not exposed to unnecessary vibration. Connect the cable and the limit switch (optional). The limit switch may be connected either to the pump or to the controller.

Connect the controller's power cable to the tractor's tripolar power outlet (red +, yellow –), the voltage of the fuse being max. 15 A.

⚠ INCORRECT WIRING MAY DAMAGE THE CONTROLLER!

4. Controller usage and key functions

4.1 Controller buttons and their functions



1. On/off -switch
2. Power adjustment
3. Flow button
4. Trip button
5. Total button
6. Reset button
7. Shift button
8. Pump: start/stop
9. Pump: signal light
10. Limit switch: signal light
11. Digital display
12. Flow: signal light
13. Trip: signal light
14. Total: signal light

As the controller is switched on using the on/off switch (1), the default settings are displayed in the following order:

- The pulse rate of the flow, pulses/litre
- The level of flow alarm, litres/minute
- The hysteresis of flow alarm, litres/minute

After this the controller enters the basic mode and is ready to operate.

The **Flow** button (3) is used to choose the flow metre. The reading on the screen shows the actual liquid flow (litres/minute) and the signal light "Flow" (12) is on.

The **Trip** button (4) is used to observe the amount of pumped litres. The number on the screen shows the amount of pumped litres and the signal light "Trip" (13) is on. The calculator can be reset to zero by pressing the Reset button (6) for 3 seconds. The Trip calculator can be used e.g. for monitoring the consumption of preservative per load.

The **Total** button (5) is used to switch on the Total calculator that shows the amount of the pumped liquid in litres while the signal light "Total" (14) is on. The calculator can be reset to zero by pressing the Reset button (6) for 3 seconds. The Total calculator can be used e.g. for monitoring the consumption of preservative per container.

When the **Shift** button (7) is pressed and held down the pump operates with full power regardless of the power adjustments and the position of the limit switch. Can be used e.g. for removing air from the system.

The **Pump** button (8) is used to start or stop the pumping. When the pump is switched on the signal light "Pump" (9) is on. The power may be adjusted steplessly with the potentiometer (2).

If the limit switch gets activated the signal light "Cut" (10) is switched on and the pumping stops. As the limit switch is released the signal light is switched off and the pumping continues according to the adjustments.

Flow alarm

When the flow lowers below the alarm level the controller gives the alarm signal. The buzzer goes off and the text "FLO" flashes on the screen. If the increase of the flow does not reach the hysteresis level in ten seconds, the controller automatically stops the pump. In this case the buzzer goes out and the text "FLO" stays on the screen. Usually the alarm is caused by the draining of the container. If there is still preservative left in the container, see chapter "Trouble shooting" (p. 20).

4.2 Default settings

PULSE RATE

The pulse rate indicates the amount of pulses in one litre of liquid. The pulse rate has been calibrated in the factory. If the flow calculators of the controller do not correspond to the actual consumption, the pulse rate can be adjusted as follows:

Check the current pulse rate. Reset the Trip calculator to zero and pump plenty of liquid (e.g. 100 litres) through. The new pulse rate can be calculated by comparing the amount calculated by the controller to the the actual amount using the following formula:

$$\text{The new pulse rate} = \frac{\text{The amount calculated by the controller}}{\text{The actual amount of litres pumped}} \times \text{The current pulse rate}$$

After changing the pulse rate, the reading of the Trip calculator should indicate the actual amount of litres pumped.

THE LEVEL OF FLOW ALARM

The default setting of the flow alarm is 1,5 l/min. If the flow decreases below the set level for more than five seconds, the alarm will be activated.

THE LEVEL OF HYSTERESIS

The level of hysteresis indicates the amount of increase in the flow above the alarm level required to stop the alarm automatically. The default setting is 0,3 l/min. In the default setting mode, the flow alarm will be activated when the flow decreases below 0,5 l/min for more than five seconds. It will be deactivated when the flow increases by more than 0,8 l/min.

4.3 Changing the default settings

To change the default settings, open the plastic case of the controller.

⚠ Turn the power off using the on/off switch prior to opening the case!

⚠ Proceed with great caution!

Behind the controller's circuit card there are two programming buttons that can be used to change the default settings. See the picture.



The default settings can be changed by obeying the following instruction:

1. Press both programming buttons and hold them down. Switch on the controller by using the on/off switch.
2. Set new values using the buttons of the panel on the front.
 - Flow: the pulse rate decreases
 - Trip: the pulse rate increases
 - Total: the alarm level decreases
 - Reset: the alarm level increases
 - Shift: the hysteresis decreases
 - Pump: the hysteresis increases
3. Release the programming buttons.

5. Taking into use

Connect the hoses between the pump unit and the suction pipe and between the pump unit and the nozzles. Mount the anti-drip valve as near the nozzles as possible. The direction of flow is indicated by the arrow on the valve frame.

Choose the nozzles according to the amount of litres you are going to pump. With nozzles too large the flow may be distributed unevenly which may weaken the power of the flow. With nozzles too small the counter pressure of the system increases, and the desired flow level may not be achieved. The liquid may also disperse into spray that is easily blown away by the wind.

The acid applicator is equipped with a pressure switch. If the pressure of the system increases above the set level, the pressure switch will stop the pump. The default setting of the pressure switch is 3 bars.

5.1 Testing

Prior to acid pumping the system must be tested by pumping clean water through the pump. The testing is easier to do after the pump has been mounted to the harvesting machine as the conditions are then similar to the actual use.

The following should be observed during the pumping test:

- The operating of the pump
- The operating of the flow sensor
- The evenness of the distribution of the flow from the nozzles
- The durability of the equipment and all the joints

A test run is also recommended prior to the beginning of the harvest season.

6. Additional equipment

Different kinds of limit switches can be used to control the operating of the Spreader applicators. There are three options: a mechanical limit switch, a magnetic limit switch and a control relay.

The limit switch can be mounted e.g. to the pick-up of the silage machine.

A control relay can be used if there is an available signal coming from the silage machine for controlling the applicator. Check the availability of signal in the manual of the silage machine.

The limit switch can be connected either to the controller or to the pump's limit switch coupling.

NB: Only use the original components.

NB: Supplying the limit switch coupling with voltage not allowed!

7. Maintenance and storing

The acid applicator must always be cleaned after use by pumping clean water through the whole system. External cleaning is also necessary. During cleaning, the electronic components must be protected from water. After cleaning, the pump and the electric couplings must be carefully dried.

 Do not use a pressure washer for cleaning the pump!

 Use the appropriate personal protective equipment!

After use the acid applicator must be stored in a dry place, protected from sunlight. If the acid applicator is stored in a cold place, pump antifreeze through the system before storing to prevent freezing.

8. Trouble shooting

Error	Possible cause	Solution
The pump does not start.	The pump is out of power.	Check the power cables and couplings.
	The limit switch is activated.	Release the limit switch.
The pump starts but then stops immediately.	The counter pressure is too high. The pressure switch stops the pump.	Remove the possible block, check the mounting of the quick couplings or widen the nozzles.
There is no suction.	A block in the suction filter.	Clean the filter.
	Air in the suction pipe.	Check the condition of the suction pipe and the joints.
	The suction fails because of small output caused by a long suction hose.	Press the Shift button and hold it down until the suction begins.
	The valves are worn out.	Change the valves.

Error	Possible cause	Solution
The output is weak.	The valves are worn out.	Change the valves.
	The counter pressure is too high.	Remove the possible block, check the mounting of the quick couplings or widen the nozzles.
"FLO" alarm.	Flow alarm, flow below the alarm level	Make sure there is still liquid left in the container. Remove the cause of the counter pressure.
	The controller does not receive the pulse data from the flow sensors.	Adjust the alarm level. Check the wires and the couplings. Damaged flow sensor. (Deactivating the FLO-alarm: Set the alarm rate to 0.)
"ERR1" alarm.	Short circuit in the sensors.	Check the wires and the couplings.

9. Terms of guarantee

- The warranty period for the machines manufactured by Happowa Oy is 12 months.
- The warranty period begins on the date the authorized dealer has delivered the new equipment.
- Warranty covers manufacturing and material defects.
- Damaged parts that have been made a complaint about during the warranty period will be replaced or repaired free of charge if they are returned to the manufacturer, the shipping paid by the customer.
- The parts that have not been manufactured by Happowa Oy, such as the circuit cards and electric motors, are covered by the warranty of the supplier in question.
- Warranty does not cover the operating and travelling expenses.
- Warranty is only valid if the fault has been reported to our dealer within 14 days from the delivery date.

Warranty does not cover:

- Damages caused by normal wear or incorrect maintenance.
- Damages caused by incorrect use.
- Repairs or changes made without the consent of the manufacturer and the damages caused by them.
- Secondary damages and the financial losses caused by them.
- Damages caused by incorrect wiring.

Subject to change without notice.

10. Responsibilities


Manufacturer is not responsible if the acid applicator is used contrary to safety regulations or this operating manual. Since the use of the acid applicator may cause situations for which there are no instructions or regulations, the operators are recommended to follow general machine safety instructions and directives.

Note that the incorrect use of acid may cause harm to people, animals, bodies of water and soil. Follow the instructions provided by the manufacturer of the preservative and other experts regarding the handling and use of preservatives.

Manufacturer is not responsible for the incorrect use of preservatives or secondary damages caused by it. Manufacturer is not responsible for damages caused by the use of components manufactured by others. Manufacturer is not responsible for damages to other machines or equipment caused by the use of preservatives.

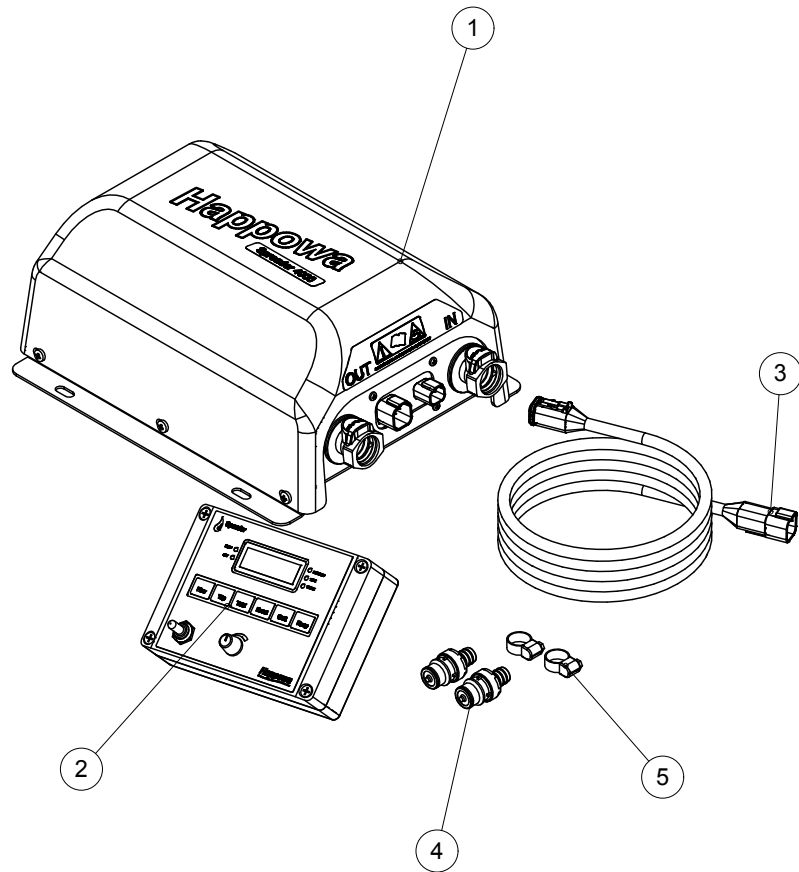
The owner of the machine is responsible for its use, care and maintenance.

The owner of the machine is responsible for making sure that all people using the machine are sufficiently informed of its handling and use.

 Since the manufacturer cannot supervise the use of the products we can only guarantee their quality. We cannot take responsibility for the performance of the products.

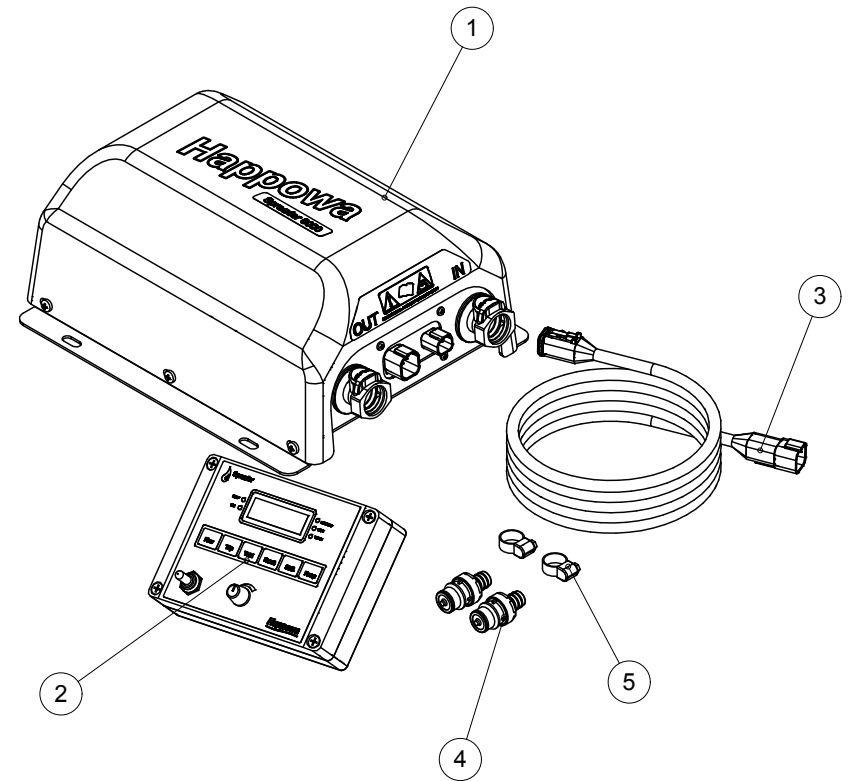
Spare parts

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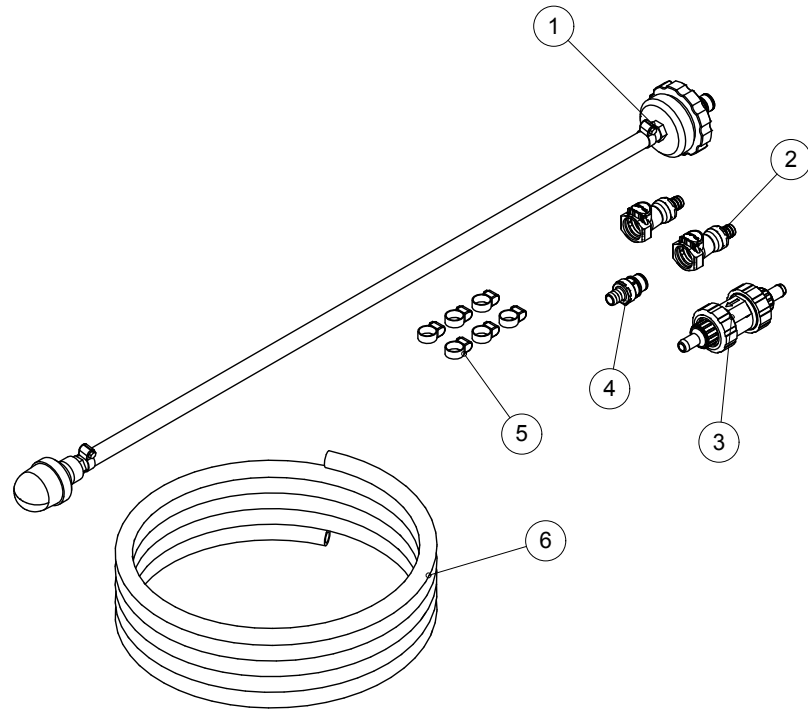
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1	337440	Spreader 4000 -pumppuyksikkö	Spr. 4000 pump unit	Spr. 4000-pumpenhet	1
2	322005	Spreader-ohjain	Spreader controller	Spreader-kontrollerr	1
3	322008	Spreader-välkäapeli	Spreader jumper cable	Spreader-mellankabel	1
4	337113	Pikaliitinpistoke 12 mm	Quick coupling plug 12 mm	Snabbstickkontakt 12 mm	2
5	328945	Letkunkiristin 13-20 mm	Hose clamp 13-20 mm	Slangklämma 13-20 mm	2

103420



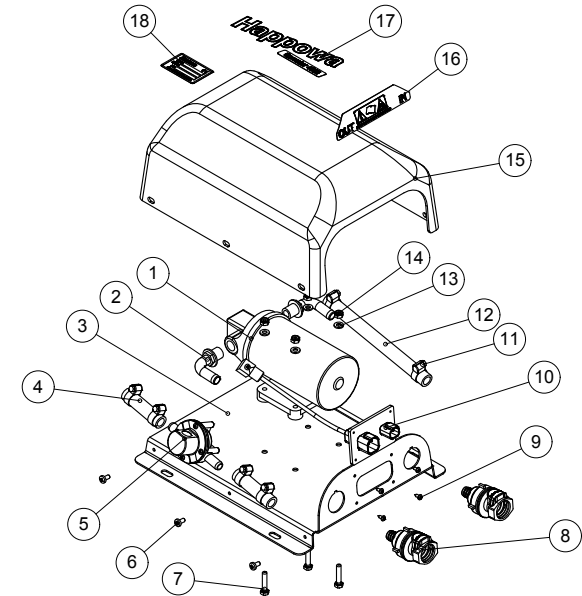
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1	337460	Spreader 6000 -pumppuyksikkö	Spr. 6000 pump unit	Spr. 6000-pumpenhet	1
2	322005	Spreader-ohjain	Spreader controller	Spreader-kontrollerr	1
3	322008	Spreader-välkäapeli	Spreader jumper cable	Spreader-mellankabel	1
4	337113	Pikaliitinpistoke 12 mm	Quick coupling plug 12 mm	Snabbstickkontakt 12 mm	2
5	328945	Letkunkiristin 13-20 mm	Hose clamp 13-20 mm	Slangklämma 13-20 mm	2

320018



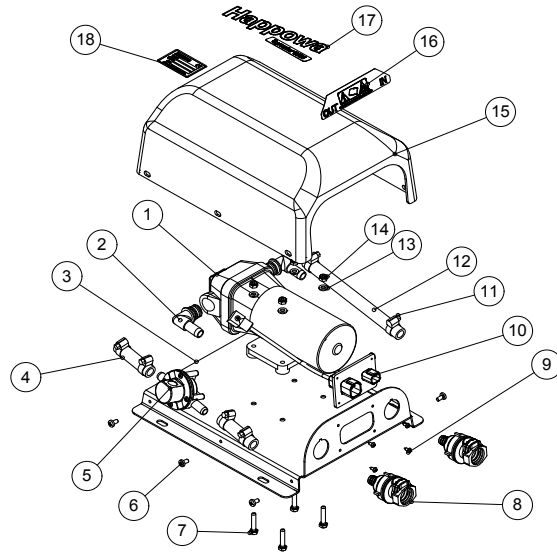
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1	337006	Imuputki	Suction pipe	Sugrör	1
2	337112	Pikaliitinrunko 12 mm	Quick coupling male	Snabbkoppling hane	2
3	113240	Tippumisenesteventtiili 12 mm	Anti-drip valve 12 mm	Droppstoppsventil 12 mm	1
4	337113	Pikaliitinpistoke 12 mm	Quick coupling plug 12 mm	Snabbstickkontakt 12 mm	1
5	328945	Letkunkiristin 13-20 mm	Hose clamp 13-20 mm	Slangklämma 13-20 mm	6
6	111651	Pvc-letku 12 mm	Pvc-hose 12 mm	Pvc-slang 12 mm	1

337440



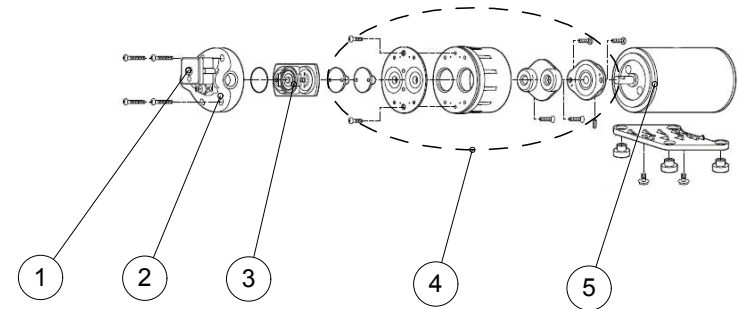
Osa Nr.	Tunnus Code	Suomi	English	Svenska	Kpl. Pc. St.
1	157350	Kalvopumppu 2-mäntäinen	2-piston diaphragm pump	2-kolvs membranpump	1
2	157206	Letkulähtö 12 mm	Hose coupling 12 mm	Slangkoppling 12 mm	2
3	337017	Pohjalevy	Bottom plate	Bottenplatta	1
4	111651	Pvc-letku 12mm	Pvc-hose 12 mm	Pvc-slang 12 mm	2
5	113230	Virtausanturi	Flow sensor	Flödesgivare	1
6	133143	Uraruuvi M5 x 10	Slot headed screw M5 x 10	Spårskruv M5 x 10	6
7	113146	Kuusioruuvi M6 x 30	Hexagonal bolt M6 x 30	Sexkantsskruv M6 x 30	4
8	337109	Pikaliitinrunko 12mm	Quick coupling plug 12 mm	Snabbstickkontakt 12 mm	2
9	133141	Levyruuvi 3,5 x 9,5	Screw 3,5 x 9,5	Skruv 3,5 x 9,5	4
10	142210	Liitinpaneeli	Connector panel	Kopplingsbord	1
11	328945	Letkunkiristin 13-20 mm	Hose clamp 13-20 mm	Slangklämma 13-20 mm	6
12	111651	Pvc-letku 12 mm	Pvc-hose 12 mm	Pvc-slang 12 mm	1
13	133028	Aluslevy M6	Washer M6	Bricka M6	4
14	133020	Lukitusmutteri M6	Nut M6	Mutter M6	4
15	337027	Kansi	Lid	Lock	1
16	SH1211142	Varoitustarra	Warning sticker	Varningsdekal	1
17	SH1902152	Spreader 4000 -tarra	Spreader 4000 sticker	Spreader 4000 -dekal	1
18	SH1211144	Konekilpi	Machine plate	Märkplåt	1

337460



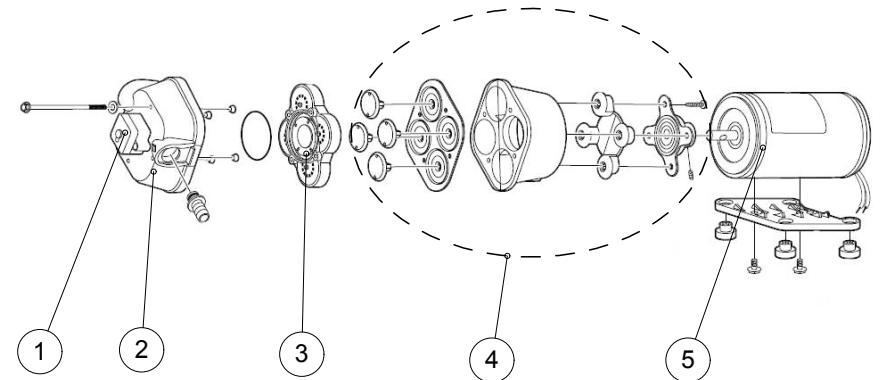
Osa Nr.	Tunnus Code	Suomi	English	Svenska	Kpl. Pc. St.
1	157352	Kalvopumppu 4-mäntäinen	4-piston diaphragm pump	4-kolvs membranpump	1
2	157210	Letkuliitin 1/2"	Hose coupling 1/2"	Slangkoppling 12 mm	2
3	337017	Pohjalevy	Bottom plate	Bottenplatta	1
4	111651	Pvc-letku 12 mm	Pvc-hose 12 mm	Pvc-slang 12 mm	2
5	113230	Virtausanturi	Flow sensor	Flödesgivare	1
6	133143	Uraruuvi M5 x 10	Slot headed screw M5 x 10	Spårskruv M5 x 10	6
7	113146	Kuusioruuvi M6 x 30	Hexagonal bolt M6 x 30	Sexkantsskruv M6 x 30	4
8	337109	Pikaliitinrunko 12mm	Quick coupling plug 12 mm	Snabbstickkontakt 12 mm	2
9	133141	Levyruuvi 3,5 x 9,5	Screw 3,5 x 9,5	Skruv 3,5 x 9,5	4
10	142210	Liitinpaneeli	Connector panel	Kopplingsbord	1
11	147151	Klemmari 12-22 mm	Hose clamp 12-20 mm	Slangklämma 12-20 mm	6
12	111651	Pvc-letku 12 mm	Pvc-hose 12 mm	Pvc-slang 12 mm	1
13	133028	Aluslevy M6	Washer M6	Bricka M6	4
14	133020	Lukitusmutteri M6	Nut M6	Mutter M6	4
15	337027	Kansi	Lid	Lock	1
16	SH1211142	Varoitustarra	Warning sticker	Varningsdekal	1
17	SH1902153	Spreader 6000 -tarra	Spreader 6000 sticker	Spreader 6000 -dekal	1
18	SH1211144	Konekilpi	Machine plate	Märkplåt	1

157350



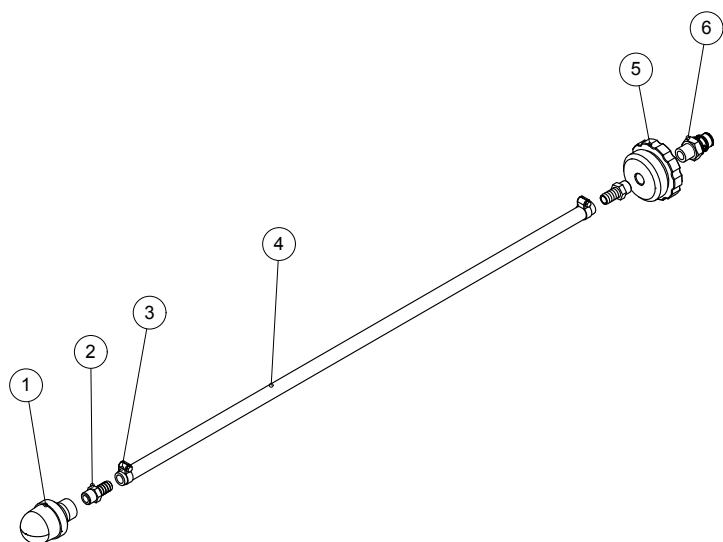
Osa Nr.	Tunnus Code	Suomi	English	Svenska	Kpl. Pc. St.
1	337122	Painekytin	Pressure switch	Tryckbrytare	1
2	337124	Pumpun pääty	Pump end mounting	Pumpbotten	1
3	337122	Venttiilarja 2-mäntäinen	Valve set, 2-piston	Ventilerie, 2-piston	1
4	337126	Alempi pumpunpesä	Lower pump housing	Nedre pumphus	1
5	337120	Moottori	Engine	Motor	1

157352



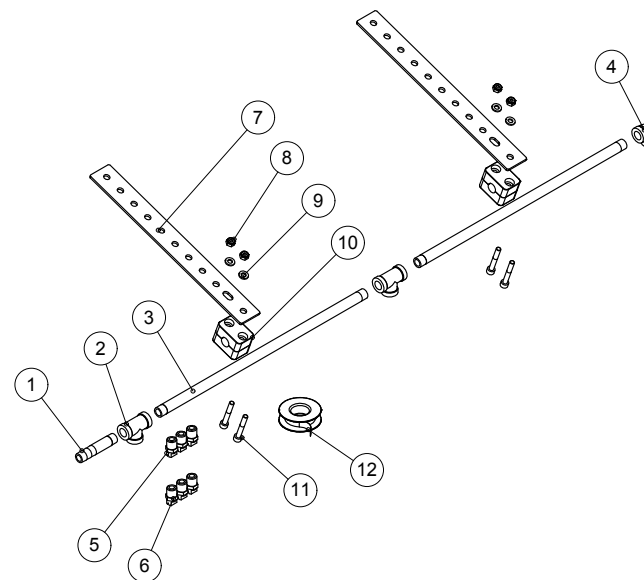
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1	337122	Painekytin	Pressure switch	Tryckbrytare	1
2	337134	Pumpun pääty	Pump end mounting	Pumpbotten	1
3	337132	Venttiilarja 4-mäntäinen	Valve set, 2-piston	Ventilerie, 2-piston	1
4	337136	Alempi pumpunpesä	Lower pump housing	Nedre pumphus	1
5	337130	Moottori	Engine	Motor	1

337006



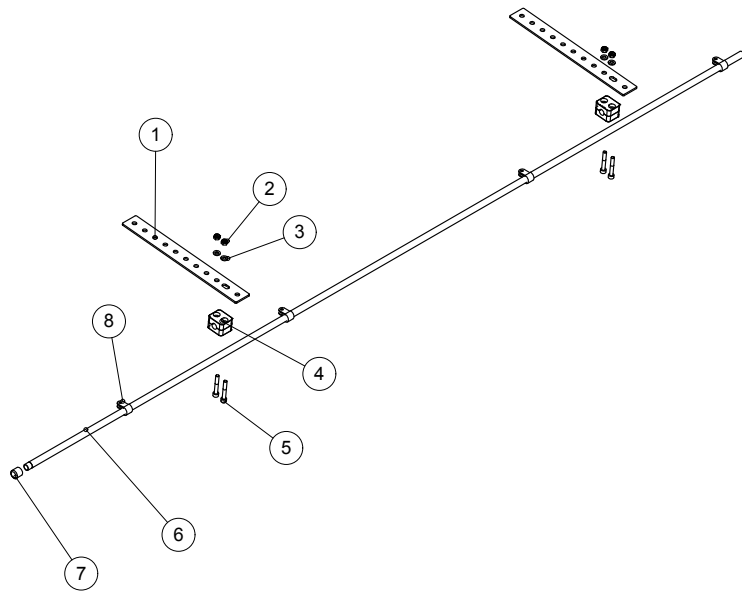
Osa Nr.	Tunnus Code	Suomi	English	Svenska	Kpl. Pc. St.
1	337202	Imusuodatin koottu	Suction filter, complete	Sugfilter, monterat	1
2	313287	Letkuliitin 3/8" 13mm	Slangkoppling 3/8" 13 mm	Hose coupling 3/8" 13 mm	2
3	328990	Letkunkiristin A4 12-22	Hose clamp A4 12-22	Slangklämma A4 12-22	2
4	111651	Pvc-letku 12 mm	Pvc-hose 12 mm	Pvc-slang 12 mm	1
5	320032	Tynnyrisovite	Barrel adapter	Fatadapter	1
6	337108	Pikaliitinpistoke 3/8"	Quick coupling plug 3/8"	Snabbstickkontakt 3/8"	1

337400



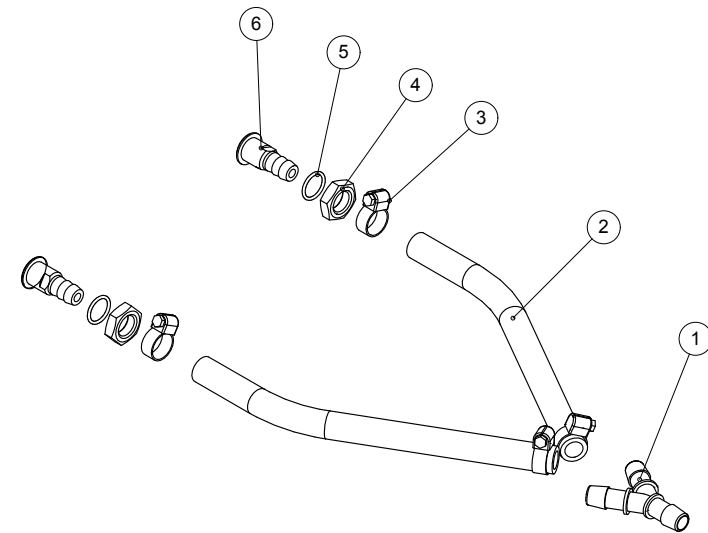
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1	313284	Letkuyhde	Hose coupling	Slangkoppling	1
2	313282	T-nippa	T-adapter	T-koppling	2
3	337403	Väliputki	Pipe	Rör	2
4	313283	Kulmanippa	Elbow adapter	Vinkelkoppling	1
5	313293	Viuhkasuutin 1,1 l/min 9504	Flat spray nozzle	Spaltspridarmunstycke	3
6	313298	Viuhkasuutin 2,2 l/min 9508	Flat spray nozzle	Spaltspridarmunstycke	3
7	1666	Kiinnityslevy	Mounting plate	Fästplatta	2
8	133020	Lukitusmutteri M6	Nut M6	Mutter M6	4
9	133028	Aluslevy M6	Washer M6	Bricka M6	4
10	337420	Putken kiinnikepari 13,5 mm	Pipe fastener 13,5 mm	Rör fästdon 13,5 mm	2
11	133630	Kuusiokoloruuvu M6x40	Hex. socket head screw	Sexkanthållsskruv	4
12	313289	Putkiteippi	Tape	Tejp	1

337410



Osa Nr.	Tunnus Code	Suomi	English	Svenska	Kpl. Pc. St.
1	1666	Kiinnityslevy	Mounting plate	Fästplatta	2
2	133020	Lukitusmutteri M6	Nut M6	Mutter M6	4
3	133028	Aluslevy M6	Washer M6	Bricka M6	4
4	337421	Putken kiinnikepari 12 mm	Pipe fastener 12 mm	Rör fästdon 12 mm	2
5	133630	Kuusiokoloruuvi M6x40	Hex. socket head screw	Sexkanthållsskruv	4
6	337412	Pistesuutinputki	Spridarrör	Spray bar	1
7	337414	Tulppa	Plug	Propp	1
8	303115	Klemmari	Clamp	Klämmare	4

113351



Osa Nr.	Tunnus Code	Suomi	English	Svenska	Kpl. Pc. St.
1	157302	T-haara	T-connector	T-koppling	1
2	111651	Pvc-letku 12 mm	Pvc-hose 12 mm	Pvc-slang 12 mm	2
3	328945	Letkunkiristin 13-20	Hose clamp 13-20	Slangklämma 13-20	4
4	133116	Matala mutteri M16 x 1,5	Nut M16 x 1,5	Mutter M16 x 1,5	2
5	144981	O-rengas 16 x 2	O-ring	O-ring	2
6	113011	Silppurisuutin	Chopper nozzle	Flismaskin munstycke	2



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