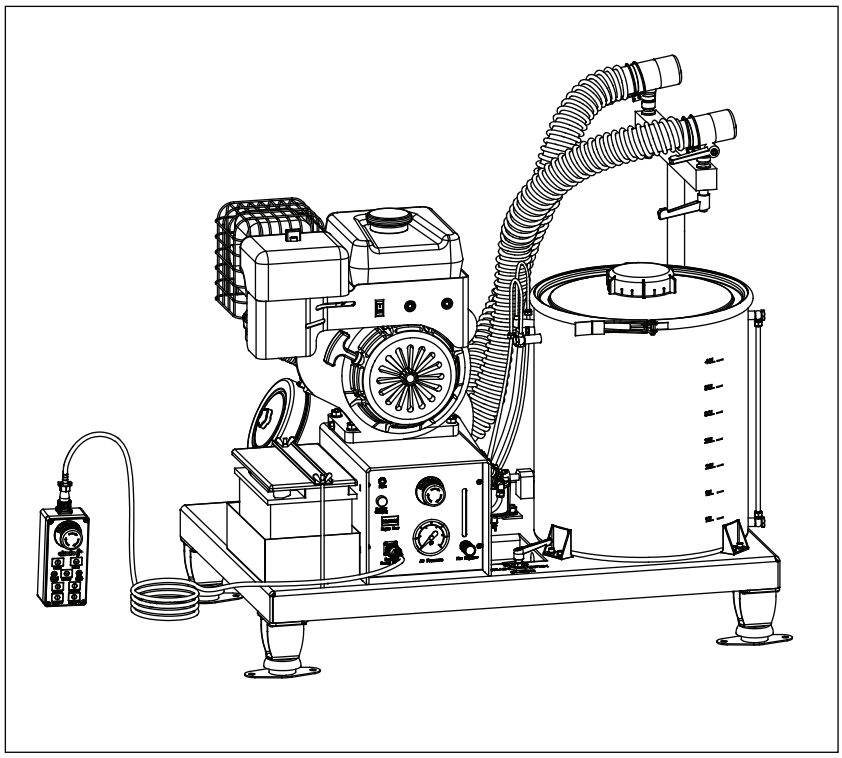
ULV Cold Fogging Machine
Vehicle-mounted model UM-2

Original Instruction



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1. General information

Thank you for purchasing AIROFOG quality product. We wish you all the success on the application and believe you will be fully satisfied with its performance.

These instructions expatiate all the information necessary for the use of the application by means of explosion drawings, start-up, operation, maintenance, cleaning, trouble-shooting and etc. as well as all safety precautions to be taken throughout the lifetime of the machine.

Airofog ULV cold fogging machine model UM-2 is in CE conformity in scope of
* 2006/42/EC Machinery directive
* 2009/127/EC Machinery directive for pesticide application
* 2004/108/EC Electromagnetic compatibility
* 2000/14/EC amended by 2005/88/EC Noise emmission...for use outdoors
* 2002/44/EC The minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration)
* 2009/251/EC Dimethylfumarate (DMFu)
* EN ISO 4254-1:2013 Agricultural machinery - safety - part 1: general requirements
* EN ISO 4254-6:2009+AC:2010 Agricultural machinery - safety - part 6: sprayers and liquid fertilizer distributors

All data and information concerning in this instruction manual are based on and given to the best of our experience and knowledge so far. This manual might change to meet our technical improvement without notice along with the continuous technological development.

Please feel free to contact us for updated information.

1.1 Machine data

machine name:	ULV cold fogging machine (ULV aerosol generator)
machine model:	UM-2
machine series no.:	27170203
year of construction:	2015
engine model:	25T2
type:	370042-H1
engine series no.:	1408131601035
blower series no.:	28601001

EC Declaration of Conformity

We: **Airofog Machinery Co., Ltd.**

1st Floor, Blk. 3, No. 67 Lane 1768, Li Yue Road, Minhang District,
Shanghai 201114, P. R. China

Do hereby declare that:

ULV Cold Fogging Machine (Aerosol Generator)

Model:

UM-2
(serial no. 27170203)

Are in conformity with the following directives and/or standards:

* *2006/42/EC Machinery directive*
* *2009/127/EC Machinery directive for pesticide application*
* *2004/108/EC Electromagnetic compatibility*
* *2000/14/EC amended by 2005/88/EC Noise emmission...for use outdoors*
* *2002/44/EC the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration)*
* *2009/251/EC Dimethylfumarate (DMFu)*
* *EN ISO 4254-1:2013 Agricultural machinery - safety - part 1: general requirements*
* *EN ISO 4254-6:2009+AC:2010 Agricultural machinery - safety - part 6: sprayers and liquid fertilizer distributors*

Notes:

This declaration becomes invalid if technical or operational modifications are introduced without the manufacturer's consent.

Person responsible for keeping the technical file:

Name, Surname: Mr. Bernhard, BETTE
Address: Gladenbacher Weg 13, Biebertal, Germany 35444

Person responsible for making this declaration:

Name: Mr. Choke Hua, PHUA

Signature:

Title of Signature: Managing Director
Date / Place of Issue: 25-12-2015 / Shanghai 201114, China

CE

2. Usage

Airofog vehicle-mounted ULV cold fogging machine (ULV aerosol generator), hereinafter referred to as “fogger”, uses pre-mixed solutions or chemicals mixed with carrier. As all components exposed to solution are made from corrosion-resistant materials like stainless steel, Teflon, polyethylene and etc., all approved chemicals that do not attack such materials can be used.

The selection of chemical preparation and carrier is subject to legally binding regulations and the manufacturer’s guidelines.

Insecticide must only be sprayed while the vehicle is moving within the treatment area. When in stationary position, direct the fog along passageway or cover the plants in the fog affected area.

The fogger suits for following purposes and applications:
- vector and insect control
- pest control
- public health
- plant protection with pesticides and fungicides.
- stock protection
- Hygine and disinfection
- deodorization

2.1 Health and safety precautions

Airofog fogger UM-2 is fully tested and provided with safety devices. However, failure can be caused due to misuse or service errors. Please read carefully the provided instruction manual and highly pay attention to safety regulations before you use. Only trained and qualified personnel who are fully knowledgeable of the use of such machines are authorised to do the operation and maintenance.

We guarantee correct manufacturing and function if the fogger is in proper use accordingly to instructions. Arbitrary modifications and alterations are not allowed. The guarantee is invalidated if damage occurs due to improper use/repair/maintenance, incorrect transport or handling, the use of non-recommended parts/products or acceptance of damaged/broken machines by any reason.

Warning is highlighted in this manual as: **indentified important notes**.

1. Application of insecticides should follow recommendations of the manufacturers. Adhere to all relevant handling precautions and regulations especially when mixing and using toxic substances, operators must wear protective clothing, gloves, eye protector and masks.

2. Ensure the fogger is calibrated correctly for the insecticide being applied.

3. Always keep first aid and washing facilities available, personnel should be aware of usage.

4. Wear suitable clothing, gloves and eye protection to protect skin and eye from exposure to chemicals.

5. Residues of insecticide must be stored or disposed safely, keep it out of reach of personnel or any target where contamination could give adverse effect.

6. Personnel with heart pacemakers must consult their doctors before operation due the fogger is started by using electronic ignition coil.

7. Wear ear protection during operation as the fogger produces a sound level of 95dBA.

8. During operation the doors and windows of the vehicle cab should be kept closed, personnel in the cab should not wear hearing protection.

2.2 Handling, operation and application

Following recommendations are for guidence only and do not exclude any statutory requirement.

- Ensure this Instruction Manual is kept with fogger at all times.

- To move or lift up the fogger, forklift must be used. When putting the forks underneath the fogger's chassis, stability should be attentioned.

- For stationary use, ensure the fogger is mounted evenly and horizontally without tilt.

- When the fogger is used on the moving vehicles, it must be secured to the bed of vehicle by M10 bolts, nuts and washers. All the 4 buffer feet have to be bolted.

- If installing the fogger on a light-weight vehicle or trailer, it must be positioned such the weight of machine does not affect the stability or road worthiness of the vehicle.

- After mounted on the vehicle, the fogger has to be checked again all its safety features (directive 2006/42/EC) before it can be operated.

- Never fogging while the vehicle is travelling downwind (i.e. wind blowing from behind).

- Use the fogger only for the purpose it was designed for.

- The operator should be aware of all protection and safety measures before operation.

- Observe local safety regulations for use of gasoline-driven equipment and strictly follow the engine Operator's Manual attached to this instruction manual.

- Observe local safety regulations for use of equipment on vehicle.

- Follow the safety regulations for lead-acid batteries.

- Before operation, ensure the fogger is correctly assembled in good condition with no visible damage or leaks at joints, tubes and hose. Make sure all protective devices are fitted properly.

- Stop running immediately if the fogger is not operated perfectly.

- During operation, never leave the fogger unattended.

- Do not ever run the blower without air filter.

- Not to touch hot parts due to danger of burning, e.g. engine, motor, exhaust, spray nozzles.

- Not to touch moving parts, e.g. the pullys and V-belt drive.

- Do not fog directly against walls or other fixed objects.

- Keep person or animal away from the front or vicinity of spray nozzles or exhaust outlet.

- When fogging in an enclosed room, due to combustion engine and exhaust emissions, there is a general danger of producing explosive mixture. The fogger should run outside the room and remove only its spray nozzle from extension pole into the room then start fogging. The operator should keep an eye on the maximum output per volume. Appropriate warning signs should be given in a conspicuous place to prevent people from entering the room being treated. Ensure thorough ventilation of the room before it is allowed to be used again.

- Never fill up solution tank to the level where pressure line from blower is connected to the tank.

- When engine is running, solution tank is under pressure. Do not open tank cover or cap even when fogging is stopped.

- Solution tank must be emptied after every use.

- Wash out thoroughly the solution line system after use or before maintenance. This ensures a higher reliability of operation.

- The used insecticide and insecticide container must be stored or disposed in accordance with local regulations and statutory requirements.

- Contaminated residues, clothes and etc. must be disposed according to local safety regulations.

- Regularly check for leaks fuel lines, chemical tubes, seals and connectors. Replace if necessary.

- It is recommended to have the fogger maintained annually by qualified technician.

- Follow instruction of the engine Operator’s Manual related to servicing and maintenance.

- Never modify the fogger.

2.3 Fire hazard

- Always obey the prevailing rules and regulations related to precautionary measures for fuel operated equipment.

- Always keep a fire extinguisher, which is approved suitable for burning fuel and chemicals, in the vehicle and in close proximity during mobile or stationary operation, repair and maintenance. If fire happens, smother flame with blanket and/or use a fire extinguisher as quickly as possible.

- Not to use flammable liquid as carrier.

- When filling with fuel, smoking is prohibited.

- Before filling with fuel, make sure the fogger is not hot and be careful not to spill. If spillage does occur, wipe it up immediately.

- Do not remove the fuel tank cover when the engine is running.

- Not to operate the engine if there is fuel spillage or in the danger of explosion. Relocate the fogger and avoid any form of spark until the fuel vapor is dissipated.

- Avoid fogging near naked flame, combustible material and heat source or where there is danger of dust explosion (e.g. grain mills).

- Not to leave the fogger in direct sunlight or in the vicinity of heat sources when it is not operated.

- Empty fuel tank if the fogger is not to be used for a long period.

2.4 Repair

- Only the trained and qualified personnel are authorized to repair the fogger.

- Only use original parts supplied by the manufacturer.
  A high risk will be caused when using copied parts including possibility of injury to personnel.

- Repair of engine should be carried out in accordance with the engine Operator's Manual attached to this Instruction Manual.

- Smoking is forbidden during repair.

- Before starting a repair, disconnect active power supply, shut down the fogger and wait until it is cooled down completely.

- During repair/maintenance, avoid all forms of contact with the high-tension ignition components e.g. spark plugs and ignition coil.

- After repair/maintenance, reassemble all safety devices and ensure all parts are assembled correctly, all caps and seals are in clean and serviceable condition.

- After repair/maintenance, perform a functional test by fogging only water.

- It is recommended to have the fogger inspected and checked by a qualified and authorized specialist e.g. company service representative on a regular basis e.g. annually.

2.5 Guarantee

Airofog Machinery Co., Ltd. guarantees proper manufacturring for all AIROFOG products. We undertake to replace or repair, at the company's expenses, defective materials or components that fail under conditions of normal use within one year from the original date of purchase. Airofog does not responsible for any labour costs associated with the replacement of faulty components.

The guarantee is invalidated if damage occurs due to improper use/repair/maintenance, incorrect transport or handling, the use of non-recommended parts / products or acceptance of damaged / broken machines by any reason.

The engine is covered by Briggs & Stratton Corporation worldwide warranty, which is described in the warranty leaflet supplied with the engine. In the event of a warranty claim relating to the engine, the local B&S service center should be contacted directly with both series numbers of the engine and the fogger be always quoted.

3. Technical data

FEATURES	*UM-2*
Engine	
type:	Briggs & Stratton, 4-stroke, OHV petrol engine
starting systems:	electric start or recoil
power:	10 kW (13.5 Hp) at 3600 min.
preset speed:	3000 min.
fuel tank capacity:	6.6 liter
Blower	
type:	side channel blower, anti-corrosive
drive:	3 V-belt with centrifugal clutch pulley
discharge rate:	5.4 m^3/min. at 3500 min.
air filter:	paper star filter
Solution system	
solution tank (nominal/actual volume):	AISI 304, 40/50 liter with level sensor
overpressure in solution tank:	0.25 bar, appro.
flow rate varible max.:	30 l/h
spray nozzle:	2 x nozzles, adjustable: horizontally 360^0, vertically 180^0
spray on-off control:	remote, individually
Cleaning/Flushing tank	
capacity:	AISI 304, 15 l, with tank-empty sensor
Control	
electrical power:	12 VDC / 36Ah battery (customer self-supplied)
control box:	emergency stop button solution flow rate control engine running-hour meter tank pressure gauge manometric switch flushing pump 2 x solenoid valve battery charging indicator fuse
remote control:	5 m cable emergency stop button engine start button engine stop button 2 x fog solution ON/OFF button flushing button w /tank-empty indicator control power indicator solution-empty indicator light
Noise	
Sound power level L_{WA}: (In accordance with EN ISO 4254-1:2013)	104.86 dB (A)
Sound pressure level L_{PA}: (In accordance with EN ISO 4254-1:2013)	93.3 dB (A)
Uncertainty for sound power level and sound pressure level	2.5 dB
Chassis	
type:	one-piece frame, zinc-galvanized with 4 shock absorbers
Dimension	
length x width x height:	99 x 66 x 73 cm
Net Weight	
	150 kg

* specifications subject to change without notice or obligation.

3.1 Standard accessories

- 1 x solution funnel with sieve
- 1 x petrol funnel with sieve
- 1 x engine oil funnel
- 1 x instruction manual
- 1 x spark plug spanner
- 1 x allen key 5/16”
  M6
  M8
  M10
- 3 x V-belt
- 1 x ear protector

3.2 Optional accessories

- long spray hose up to max. 10m length with solution line
- motor-driven mixing device for solution tank (i.e. when using wettable powders)
- 75 L solution tank, AISI 304

4. Working principles

A combustion engine drives the side channel blower by 3 x V-belts. The side channel blower is maintenance free and corrosion resistant. Compressed air operated from the side channel blower is well matched to the narrow-bore solution nozzle, bringing about the advantage of producing comparatively small air throughput at a high compression ratio.

The spray nozzle (atomizer) works in two stages: the first step is to break up the liquid at a high velocity. Then at the end of a short conical diffuser, compressed air enters again acting in an opposite direction and provides a better break up of the droplets. The stream of droplet is dispersed without touching the inner surface of the solution nozzle. Thus wettable powder suspensions can be applied without the danger of blocking nozzle.

Control of the throughput is done by a flow meter in which a regulating valve permits an infinitely variable output max. 40 l/h showing by a transparent tube with scale and a floating ball.

fig. 1

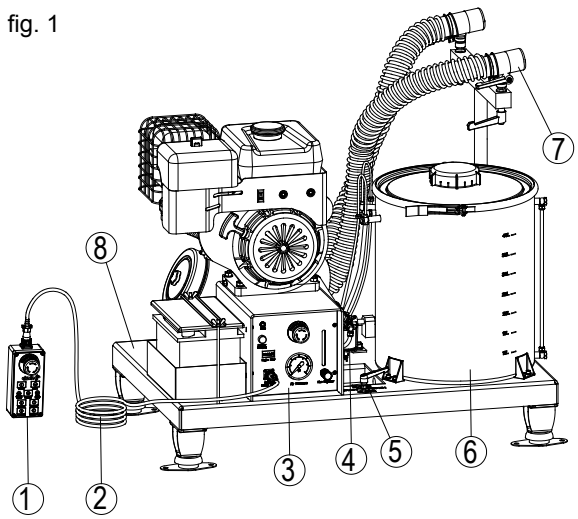
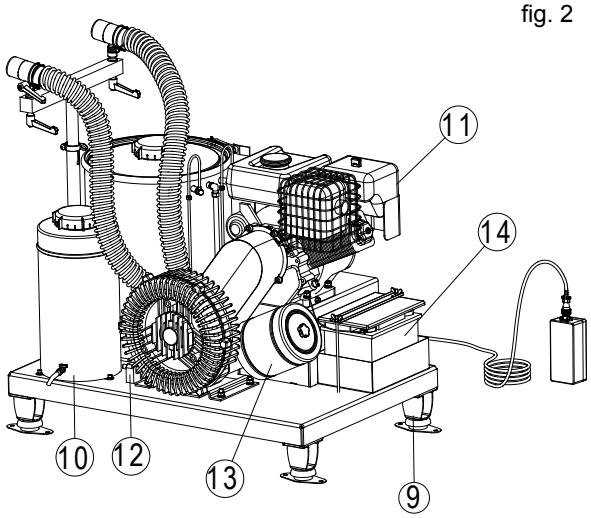


fig. 2



1. remote control
2. connecting cable
3. control box
4. solution & water filters
5. solution valve
6. solution tank
7. nozzles
8. chassis
9. rubber buffer
10. cleaning/flushing tank
11. engine
12. side channel blower
13. air filter
14. battery

4.1 Remote control features

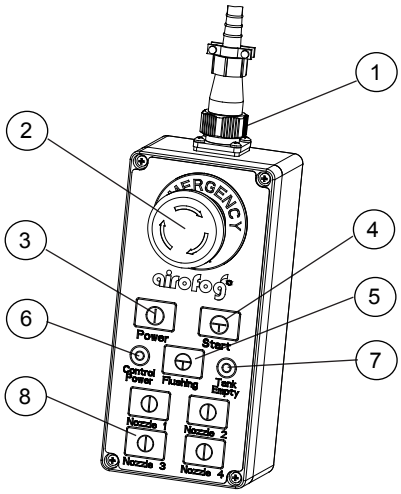


fig. 3

1. connecting nut
2. engine/emergency stop
3. power on/off button
4. engine start button
5. flushing button
6. indicator light (circuit control power on)
7. indicator light (solution tank empty)
8. push button (spray nozzle 1/2/3/4)

4.2 Control box features

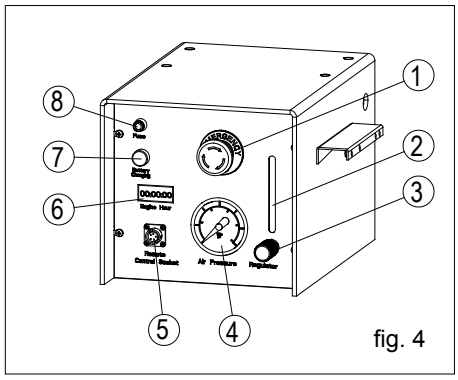


fig. 4

1. engine/emergency stop
2. flow meter
3. flow regulator knob
4. tank pressure
5. connecting socket
6. engine running hour
7. pilot light (battery charging)
8. fuse

5. Application hints

All parts exposed to the chemical solution are made from corrosion-resistant materials (stainless steel, PE and etc.). Thus, all approved chemical solutions that don't attack these materials can be used without restrictions. No damaging influences of licensed pesticides are known.

Fogging mixture:

The chemical preparation is to be mixed with clean water as a carrier. Water temperature of 20-30^{0}C supports the mixability with the chemical preparation and is of advantage to achieve a constant output and a homogeneous droplet spectrum.

To reduce the high evaporation rate of the fine aerosol droplets when water only is used as a carrier, special organic carriers like glycol, polyethyleneglycol, Nevocol or emulsifiable white oils should be added. A quantity of 5-10% of the total carrier quantity is sufficient to manifold the durability of the fine aerosol droplets. This is especially important when the relative air humidity is considerably below 90%.

The total mixture (=chemical preparation + water) should never be less than 1 liter per 1000m^2 for plant protection or per 1000 m^3 for other space treatments. A quantity of water of e.g. 2-3 liter per 1000m^2 resp. 1000 m^3 or even higher is of advantage, since more droplets of constant quality are formed and a better coverage is obtained.

In practice the following mixing ratios proved successful as a guide line:

powder formulations / water	1:15 to 1:25
liquid formulations / water	1:10 to 1:20

Observe applicable laws when selecting active solution and/or carriers.

The above are based on international application methods and experiences. Since correct application is beyond our control, we cannot be held responsible for ineffective treatment and damages caused by unsuitable chemical preparations or by incorrect application.

6. Before running

6.1 Check the power supply

- Power supply requires 12V vehicle battery, mininum power 36 Ah, maximum dimension W175 x L255 mm.
- The battery must be securely mounted and charged correctly.
- Connect the plus pole firstly then the minus pole (equipment ground).

⚠ Voltage of the battery needs to be mininum 9V.
When it is lower than 9V, the battery will not be charged from the engine.

6.2 Check the engine oil

Check the engine oil is sufficient. Not to start the engine if oil level is under the sign of minimum or above the sign of maximum (fig. 5).
Please refer to page 7 “Oil Recommendation” of the engine Operator’s Manual.

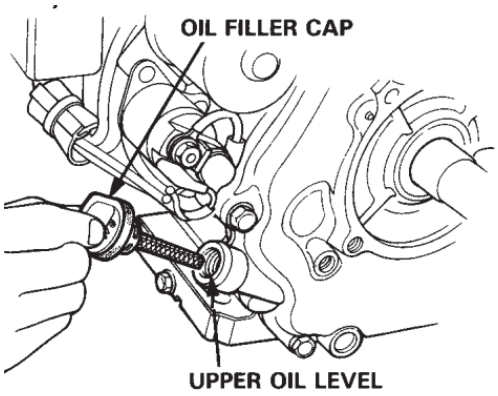


fig. 5

6.3 Fill the gasoline

Make sure of sufficient fuel amount, use only automotive gasoline.
Please refer to page 10 “Fuel” of the engine Operator’s Manual.

⚠ Always use a funnel with strainer (fig. 6-1) when refilling gasoline to the fuel tank.
Never use an gasoline/oil mixture or dirty gasoline.
Avoid dust, water or dirt in the fuel tank.

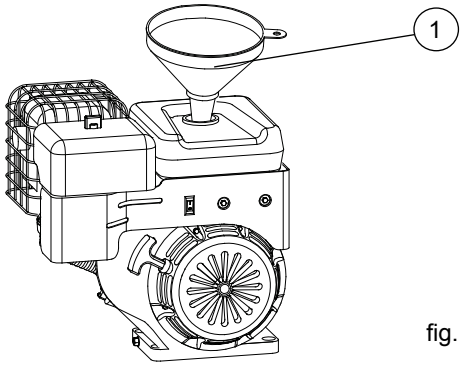


fig. 6

6.4 Fill the solution tank

⚠ When the fogger is installed on the vehicle/trailor, always stand on the bed of vehicle/trailor to fill the solution tank.

Before filling solution tank, make sure that:

- Solution valve is closed. Push down the lever and turn it till the pointer pointing to the "CLOSE" position (fig. 7).

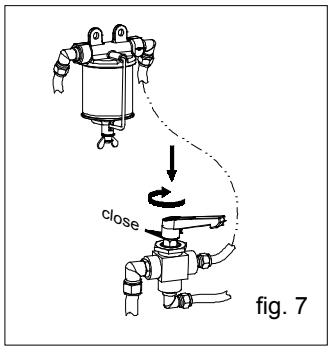


fig. 7

- Check if cover (fig. 8-4) is tightened well on the solution tank (fig. 8-1) by clamping ring (fig. 8-2). But before tightening, make sure the sealing ring (fig. 8-3) is in the correct position within the cover (fig. 8-4).

- Fill solution tank. Always use solution funnel (fig. 9-1) with strainer.
- Only fill the required solution amount for application.
- Place tank cap (fig. 8-6) with seal (fig. 8-5) in proper position then close them on tank cover tightly.

⚠ Never fill up solution tank over the max. level (fig. 9-2).

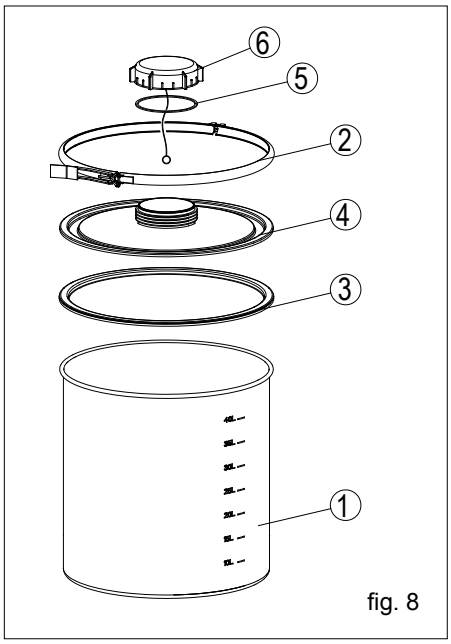


fig. 8

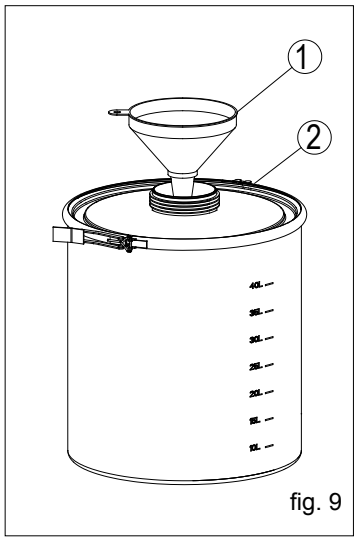


fig. 9

6.5 Fill the cleaning tank (flushing tank)

A separated 15 liter cleaning tank (water tank) is provided for operators.

It is suggested to keep clean water only, in case the operator is contacted with chemicals, he can wash with the clean water immediately.
Water or suitable cleaning agents can also be applied for flushing work after completion of pesticide application to flush the solution tank, solution pipe system and nozzles.

- Should use the funnel with strainer (fig.10-1) when filling the cleaning tank.
- From time to time cleaning the flushing tank to prevent the build-up of algae.

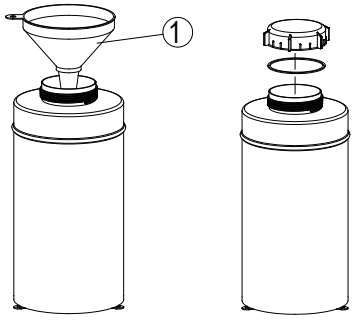


fig. 10

⚠ After the cleaning tank is filled, when the remote control power is on, the flushing light will be automatically on; on the contrary, the flushing light is be off.

6.6 Adjust the spray nozzle

By loosening the locking clamp (fig.11-4), extension pole (fig.11-3) can be pulled up or down / left or right out of the extension base (fig.11-5), thereby both height and direction of 2 spray nozzles can be adjusted simutaneously.

Individual nozzle can be adjusted angle (upward / downward) by turning locking lever (fig. 11-1), and, be adjusted direction (rightward / leftward) by turning locking lever (fig. 11-2).

⚠ After adjustment, make sure the air hose (fig.11-6) not to contact any hot part of the fogger (i.e. engine exhaust, blower and etc.)

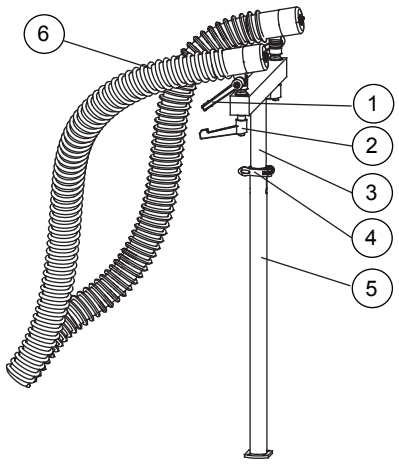


fig. 11

6.7 Connect remote control

- Connect remote control (fig.12-1) and control box (fig.12-2) by cable (fig.12-3), screw on the fixing nuts (fig.12-4) at both ends of the cable.

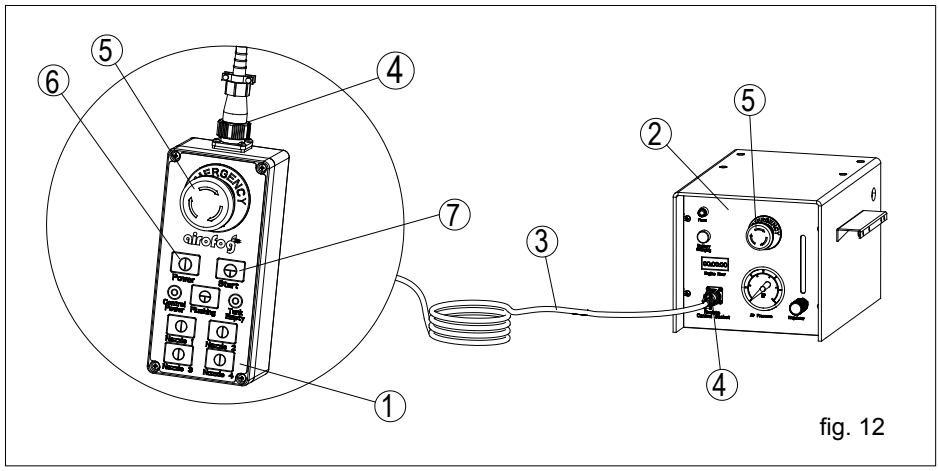


fig. 12

- Check following functions are correct:
- Release the both emergency stops buttons (fig. 12-5) on the control box and remote control
- Press the power on/off button (fig. 12-6) to ON the remote control power, the start button light (fig.12-7) will be on now.
- Press the power on/off button again, the remote control power will be off.

7. Running

7.1 Start the engine:

⚠ Please read page 6 “Starting” of the engine Operator’s Manual carefully before engine operation.

- Move the FUEL VALVE to the ON position (fig. 13).

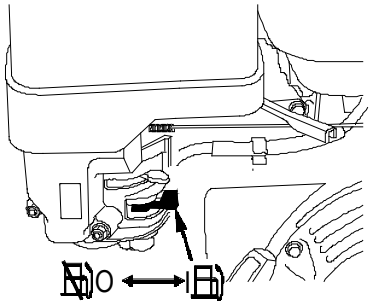


fig. 13

- Move the CHOKE LEVER to the CLOSE position (fig. 14)

⚠ Do not use the CHOKE if the engine is warm.

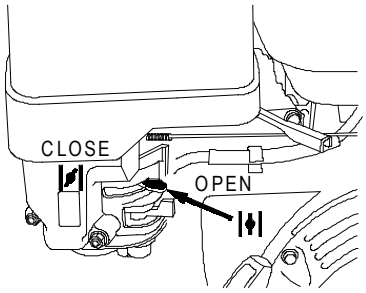


fig. 14

- Move the THROTTLE LEVER slightly to the left (fig. 15)

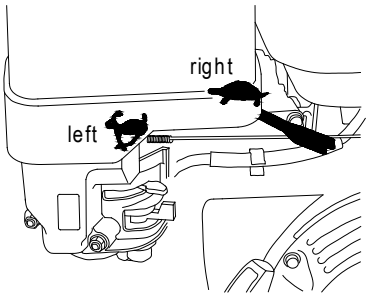


fig. 15

- Release the both emergency stops buttons (fig. 16-3) on the control box (fig. 16-2) and remote control (fig. 16-1)

- Press the power on/off button (fig. 16-4) to ON the remote control power, the start button light (fig.16-5) will be on now.

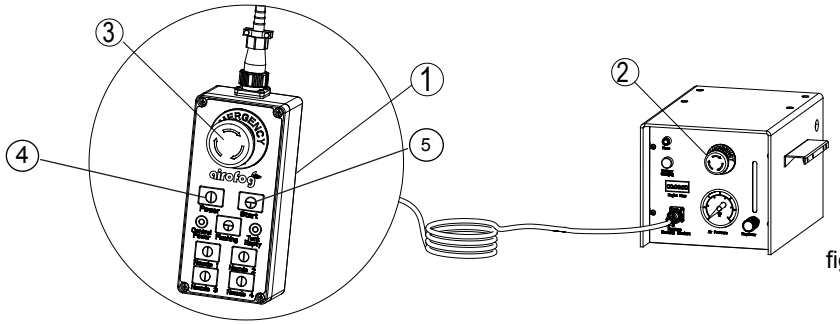


fig. 16

- press the engine switch to the “ I ” position (fig. 17)

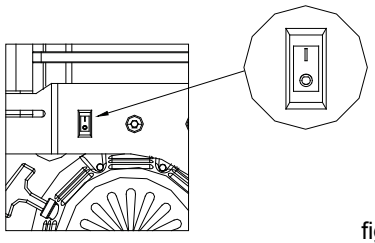


fig. 17

- Start the engine with either recoil start or electric starter.

• with recoil start:
Pull the starter grip lightly until resistence is felt, then pull briskly (fig. 18).

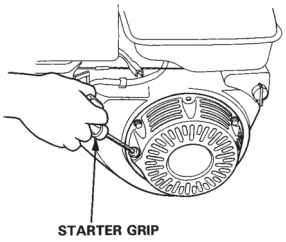


fig. 18

• with electric starter:
At the remote control push the start button (fig. 19) until the engine starts.

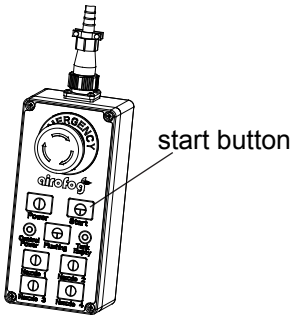


fig. 19

⚠ Do not use the electric starter for more than 5 seconds at a time. If the engine fails to start, release the push button and wait 10 seconds before operating the starter again.

- As the engine warms up, gradually move the choke lever to the OPEN position. The Charging light (green) (fig. 20-1) at the control box must be always ON when the engine is running. This indicates the battery is being charged.

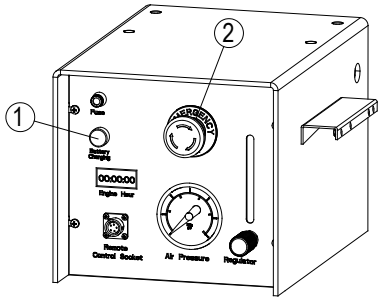


fig. 20

- Position the throttle control lever fully to the left (fig. 15) for the desired engine speed (3000 min.). When the air flow (air pressure) in the system is reached, the green Control Power light (fig. 21-1) at the remote control will be on. Only after the power control light is on, the two solution valves can be activated.

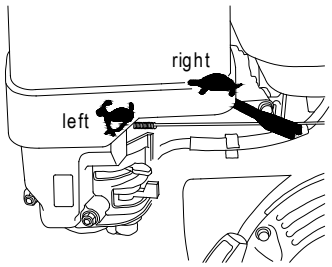


fig. 15

⚠ <u>IMPORTANT:</u>
When the engine is not running properly, stop it immediately by pressing the engine stop button either on the control box (fig. 20-2) or on the remote control (fig. 21-2); or pressing power on/off button (fig. 21-3) at the remote control; or pushing the engine switch to “0” position (fig.17).

To restart the engine, repeat steps on para. 7.1 “Start the engine”.

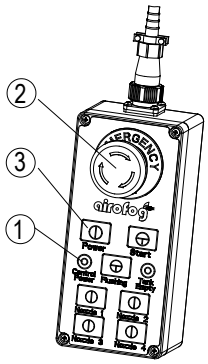


fig. 21

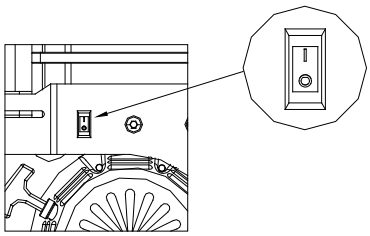


fig. 17

7.2 Fogging

⚠ Insecticide must only be fogged while vehicle is moving within treatment area.

- Open solution valve by pressing down the lever (fig. 22-1) of the valve then turning it till the pointer pointing to “OPEN” position.

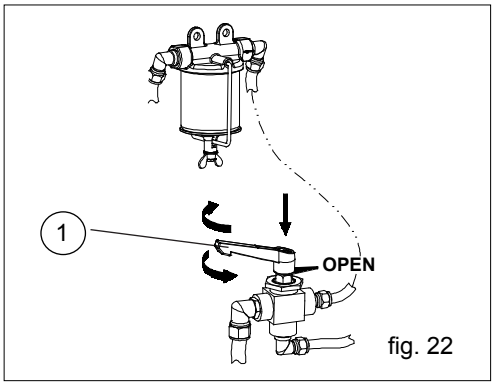


fig. 22

- At the Remote Control, push any nozzle button among Nozzle 1/2 (fig. 23), the nozzle light will be ON to open the equivalent solenoid valve. Push nozzle button again, its corresponding nozzle light and solenoid valve will be OFF.

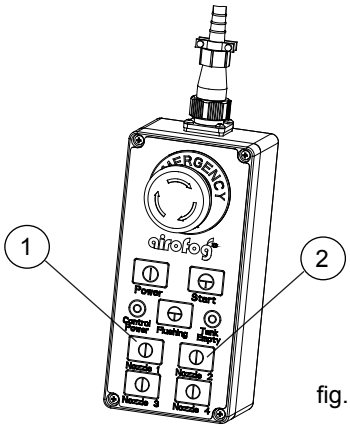


fig. 23

- Turn dosage knob (fig. 24-1) of the flow meter (fig. 25) to the desired throughput (clockwise to decrease output; anti-clockwise to increase output). Reading point is above the top level of the float/ball.

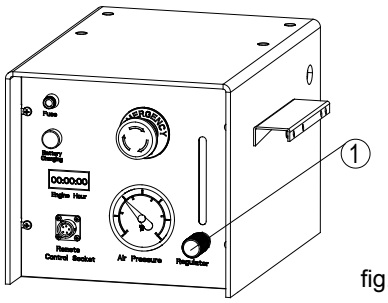


fig. 24

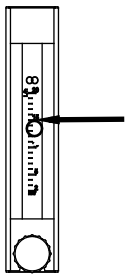


fig. 25

Under the condition that nozzles are “ON” position, for any reason if the air pressure is low, solenoid valves will close automatically at the same time when control power light (fig. 26-1) at the remote control will go off. When air pressure is reached, the control power light will be on, the solenoid valve will not open automatically unless pushing the nozzle button (fig. 26-2).

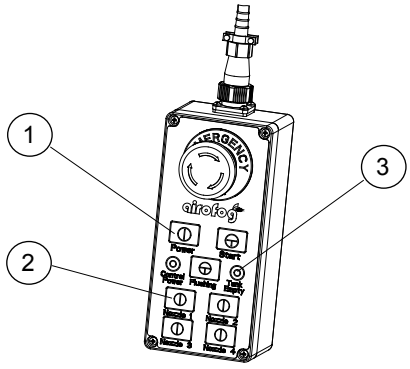


fig. 26

Please pay attention when the solution is empty, the tank empty light (fig. 26-3) will be ON for alarm, the solenoid valve remains open.

7.3 Flushing

On completion of fogging, it is highly recommended to flush the solution systems and nozzles.

Flushing covers the complete line from solution tank to nozzles.

- Before flushing, chemical residue must be emptied from the solution tank.
- Flushing light must be ON which means there is water in the cleaning tank.
- Keep pressing the flushing button (fig. 27-1) until the flushing light is off, cleaning tank will be emptied.
- All the solenoid valves will open automatically when flushing starts.
- Flushing function will be stopped automatically when the flushing tank is empty or releasing the flushing button.
- All the solenoid valves remain open.
- If the solution tank runs empty, the pipe system is blowed clean automatically.

Make sure not to leave any residue inside either the solution tank or flushing tank after each flushing.

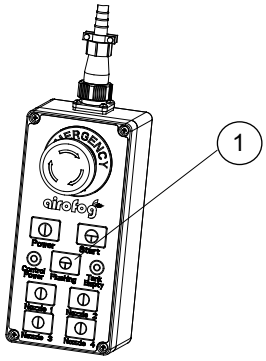


fig. 27

7.4 Before stopping engine

- When there is no vision of liquid being blowed out of nozzles, push buttons of all nozzle lights “OFF” to close the solenoid valves.

⚠ Please note the solution tank is under pressure approx. 0.3 bar.
Thus do not open the cover or tank cap when tank is under pressure (fig. 28).

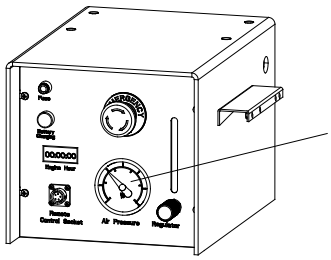


fig. 28

- Close solution valve by turning handles of the 3-way valve in vertical direction pointing to “CLOSE” position.

7.5 Stop engine

Please refer to page 8 “How to stop the engine” in the engine Operator’s Manual.

(1) Move the throttle control lever fully to the right (fig. 15).

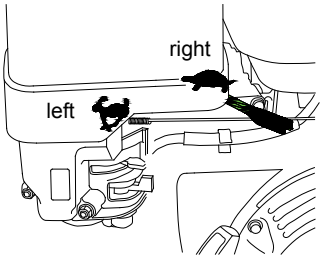


fig. 15

(2) Press the emergency stop button at either control box or remote control;
or
press the power on/off button at remote control;
or
press the engine switch to “0” position.

(3) Move the fuel valve to “OFF” position (fig. 29).

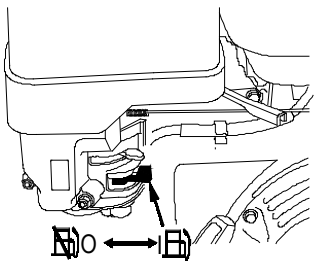


fig. 29

7.6 Metering the throughput of different solution

Condition

The flow regulator is calibrated on the following condition :
- water 20^{0}C
- absolute pressure 101325 Pa
- density 998.30 kg/m^3
- viscocity 1 cP

Fomular

$$\sqrt{\frac{(Pf - Ps)Pn}{(Pf - Pn)Ps}}$$

Qs: actual flow
Qn: indication of flow regulator
Pf: density of float /ball (7.94 g/cm^3)
Ps: density of solution
Pn: density of water at temparature of 20^{0}C and absolute pressure of 101325 Pa (998.30 kg/m^3)

The regulator shows different scale on different solution.
You may do your own throughput calculation by using above condition and fomular.

Example

For water-based solution with water percentage no less than 80%, the scale is considered to be accurate (± 10%) according to experience.

For oil-based formulations, you can calculate the throughput in the following way:
- fill solution tank to the extent that the scale is readable.
- at a constant scale (e.g. 50 l/h), fogging a certain quantity (e.g. 5l), then calculating the time used (e.g. 10 minutes):
  5l in 10 minutes = (5l x 60 minutes) : (10 minutes x 1 hour) = 30 l/h

It means on the scale of 50 l/h, actual throughput in the measured solution is 30 l/h.

Take the same procedure, following consequence can be reached:

Water	Oil
60 l/h	36 l/h
50 l/h	30 l/h
40 l/h	24 lh
30 l/h	18 l/h
20 l/h	12 l/h
10 l/h	6 l/h

7.7 Fogging in the enclosed spaces

⚠ The fogger may not be operated in the enclosed space due to its combustion engine and exhaust emissions !

If to fog in the enclosed room, leave the fogger running outside the room and ONLY put the aerosol nozzle into the room by removing the nozzle from its extension pole. When fogging in a room, there is a general danger of producing explosive mixture, the operator should observe the maximum output per volume.

The dosage of combustible parts of the total fog mixture is not allowed to exceed the following maximal rates per 1000m^3 in the below chart:

carriers for water		fuels, white oil	
Glycerine	2.5l	Vegetable oils	2.5l
Ekomist	2l	Diesel / Heating oil	2l
Ethtylene glycol	2l	Petroleum	2l
Diethylene glycol	2l	Petrolpal	2l
Aerostabil	3l	Shell Risella 15	1.5l
VK2-special	2l		

The above rates are more than enough to the limits of inflammability. Meanwhile, they are much higher than what usually dosed in the limited spaces which is 1 liter per 1000m^3 by oil based formulations.

8. Cleaning

8.1 Cleaning solution tank

The solution tank is cleaned after flushing. However, due to possible stains, manual cleaning is necessary from time to time. The tank can be emptied easily by turning solution valve lever (fig. 30-1) till the pointer pointing to “DRAINAGE” hose (fig. 30-2).

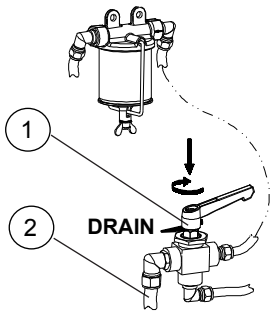


fig. 30

8.2 Cleaning solution pipe system

Cleaning solution line system ensures a higher reliability of operation and avoids residues in the system. The solution line system is cleaned after flushing. However, after every fogging the solution filter has to be particularly checked to prevent clogging.

The solution filter (fig. 31-3) can be checked from outside as long as the glass cover (fig. 31-4) is transparent. If not, dismantle by turning counter-clockwise the glass cover holder wingnut (fig. 31-5) and wash out the filter strainer.

Before assembling it back, check if the gasket (fig. 31-2) is in correct position.

⚠ Wear gloves, eye protection and protective clothing when cleaning.
Dispose of contaminated cleaning clothes and washing liquid safely.

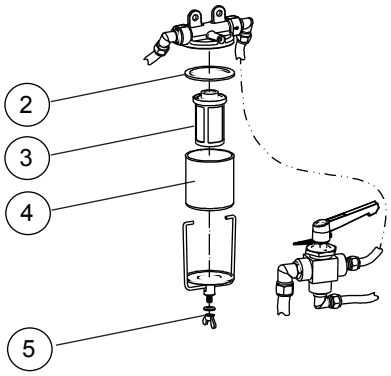


fig. 31

9. Maintenance

The fogger running hour can be found at the flow control box. When the engine is running, hour clock (fig. 32-1) starts to record the running time which will be accumulated (please do not reset).

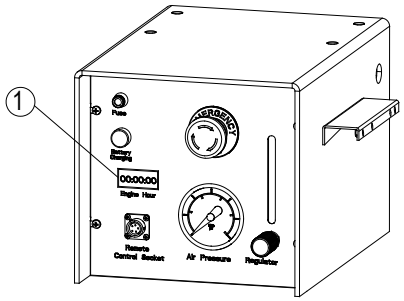


fig. 32

9.1 Engine

Please refer to page 9 “Maintenance” of the engine Operator’s Manual.

Maintenance Schedule:

First 5 hours	
#	change oil
Every 8 hours or Daily	
#	check engine oil level
#	clean area around muffler and controls
#	clean finger guard
Every 25 hours or Annually	
#	clean air filter *
#	clean pre-cleaner *
Every 50 hours or Annually	
#	inspect muffler and spark arrester
Every 100 hours or Annually	
#	change engine oil
Annually	
#	replace air filter
#	replace pre-cleaner
#	replace spark plug
#	clean air cooling system *

* In dusty conditions or when airborne debris is present, clean more often.

9.2 Engine speed

Engine speed should be checked periodically to make sure it is between 3400-3600rpm. Engine speed will affect the airflow rate of nozzle system consequently influence the droplet size.

9.3 Side channel blower

The side channel blower is equipped with sealed groove ball bearing which does not need lubrication. The grease filled is sufficient to the whole service life of the the bearing. Please remember that even small solid particles e.g. sand can damage the blower or lead to blockage of the rotor. If the conveyed medium contains solid particles or pollutions, these can be removed by the paper filter on the air intake side. Attention should be given either to a careful regular cleaning or replacement of clogged filter.

⚠ DO NOT EVER RUN THE BLOWER WITHOUT AIR FILTER ! (fig. 33)

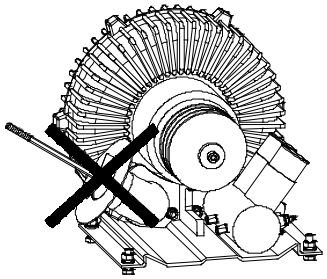


fig. 33

9.4 Cleaning the air filter (side channel blower)

- After about 20 hours of operation in normal air condition, the air filter cartridge (fig. 34-1) should be cleaned.
- To check and clean, loosen knob nut (fig. 34-3) and pull off housing (fig. 34-2).
- Pull off filter cartridge, use compressed air to blow parallel to the folds of the paper filter from outside.
- Finally blow from inside to outside.

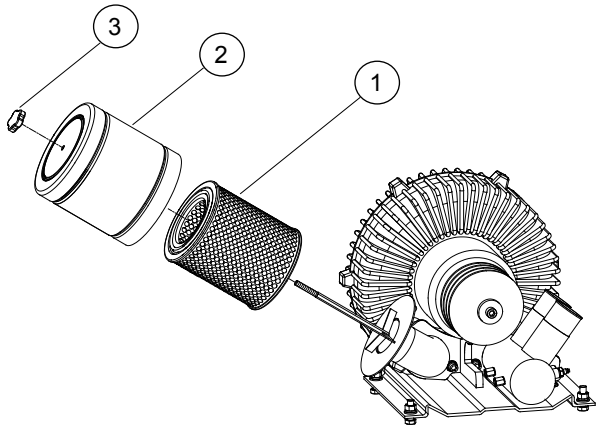


fig. 34

⚠ Clogged or damaged filter cartridge must be replaced.
Life time of the blower depends entirely on cleanness of the air filter.

9.5 V-belt drive

Check V-belt tension every week if the fogger is used regularly, make adjustment if necessary.

The tension of the V-belt can be tested by pressing down the V-belt in the condition that the fogger is switched off and belt guard is removed. The V-belt should be able to be pushed down by approx. 5-10mm (fig. 35). If the belt can be pushed over 10mm, you have to decide whether to tighten it or to relace with a new belt.

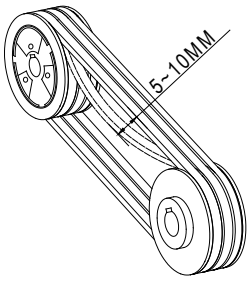


fig. 35

The tighten or replacement should follow as below:
- loosen all the 4 screws (fig. 36-1) of blower
- loosen the tension bolt nut (fig. 36-2) and locking nut (fig. 36-3)
- push blower towards engine
- take off V-belts
- fit new V-belts
- push blower back to position and tighten screws slightly, at the same time, align blower's and engine's V-belt pulleys are parallel
- tighten tension bolt nut to get necessary tension of the V-belts.
- tighten locking nut
- firmly tighten 4 screws of blower

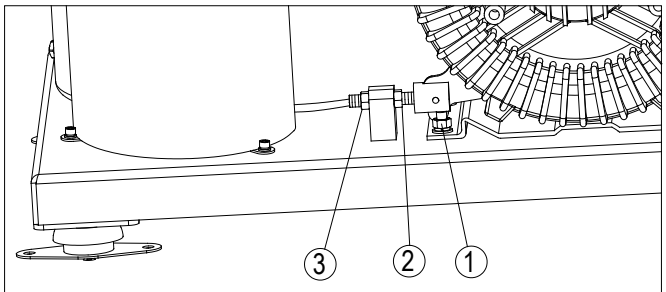


fig. 36

⚠ After repair, fit belt guard and other protective devices back, tighten all bolts and nuts.

10. Trouble shooting

10.1 Engine

The engine is equipped with a low-oil sensor that disables the ignition if the oil falls below the minimum level. Over oil filling can cause the engine very hot and to run intermittently or unexpected stop.

Please refer to page 11 “Troubleshooting” of engine Operator’s Manual.

⚠ Only trained personnel is allowed to service or repair combustion engine.

10.2 Side-channel blower

The blower is maintenance free and completely oil free.

To check if the blower is turning easily,
- Switch off the engine firstly.
- Move the belt pully backwards and forwards.
  This should be easily done if the engine is seperated from belt pully, or, if the internal flyweight of the centrifugal clutch (fig. 37-1) is separated from the clutch’s outer drum.

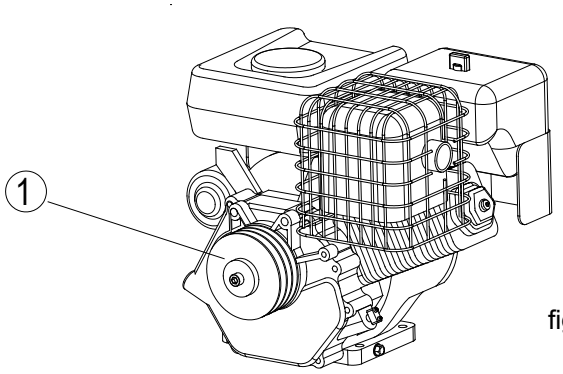


fig. 37

If the belt is blocked, it may due to following faulties:
a) the centrifugal clutch is damaged or no longer separated
b) the blower impeller touches the blower housing or housing cover or bearing is damaged.

To identify which faulty it is, please proceed as follows:
a) use the rope start from the engine. If engine with belt drive and blower can move, the clutch is damaged.

⚠ The clutch can only be replaced but never be repaired.

b) if nothing can move, the blower impeller got stuck. This might be caused by either the damaged bearings or the impeller contacting with blower housing or housing cover.

- If it is the bearing damaged, you need special tools to replace the bearings.
- If it is the impeller (fig. 38-1) touching the blower housing (fig. 38-2) or housing cover (fig. 38-3), both impeller and housing or cover have to be replaced, then we recommend to replace a complete blower.

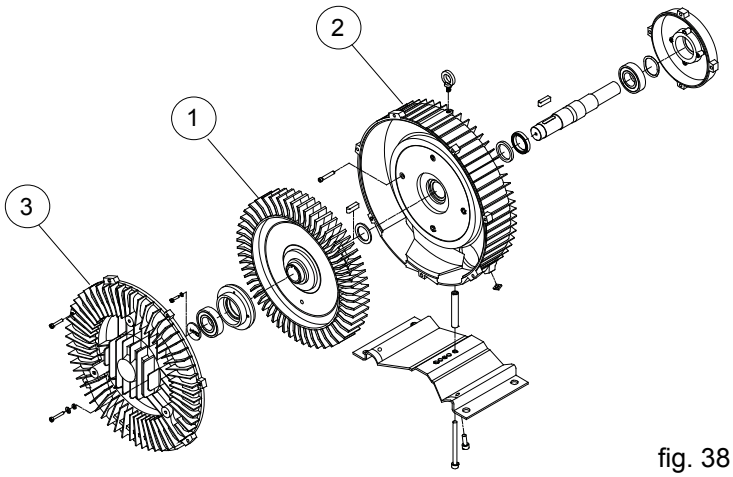


fig. 38

10.3 Solution system

10.3.1 Throughput too low or uneven

Possible causes and actions:

- If the system does not permit a larger throughput, clean solution filter
- If solution nozzle or solution hose is clogged, clean nozzle or hose
- If solution hose leaks, replace a new hose
- Check solenoid valve for free passage, choked or defective, clean or replace the solenoid valve
- If flow regulator is clogged, clean
- If pressure in the solution tank is too low, check following:
  a. Start the fogger and check the pressure gauge
     If the pressure is below approx. 180mbar, pressure in the solution tank is too low, then taking off the tank cover and cover cap, checking cover gasket and cap seal, replacing if necessary, and fitting cover and cap back to solution tank.
  b. Check pressure tube connection from blower outlet to solution tank for leakage, replace if necessary.
  c. Check air hose for leakage, replace if necessary.
  d. If engine speed is too low, check if throttle valve is fully opened.

10.3.2 No throughput

- Is the control power voltage available?
- Are the solenoid valves (fig. 39) defective or not release?

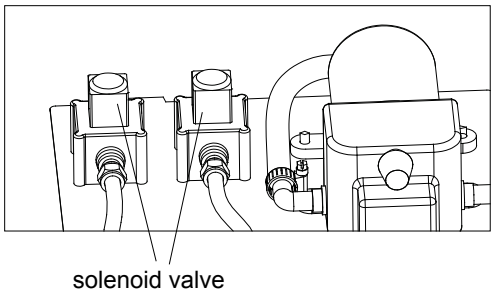


fig. 39

- Is the shut-off valve open?
- Is the solution filter clogged?
- Is the solution tube broken?
- Is there a residue blockage at the solution nozzle?
- Is the flow regulator (fig. 40) clogged?

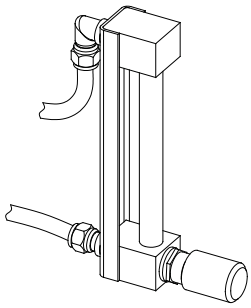


fig. 40

10.4 Electric failure

10.4.1 Charging light is not on / Battery does not charge

- check if the rectifier (fig. 41) at the engine defective or fuse (fig. 42) blow

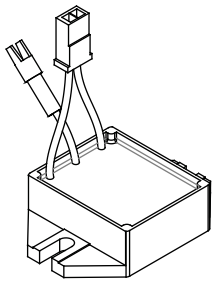


fig. 41

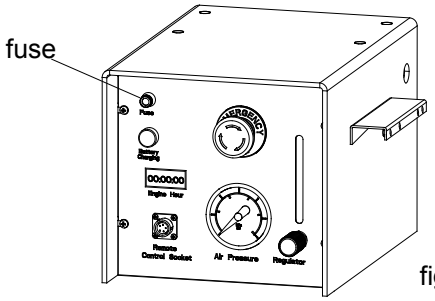


fig. 42

10.4.2 Control power light is not ON / Solenoid valve can not be activated

- check if manometric switch (fig. 43) is defective (at control box), or air pressure is too too low due to following possibilities:
  - leakage of air system
  - engine speed is slow
  - the centrifuger clutch is slip
  - the belt slip

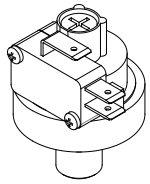


fig. 43

10.4.3 Tank empty light is not ON when solution is empty;
Tank empty light is not OFF when solution is full;

- check if the level sensor (fig. 44-1) at the tank is dirty or its cable connection (fig. 44-2) is loose or damaged
- check if the secure board at the control box is defective

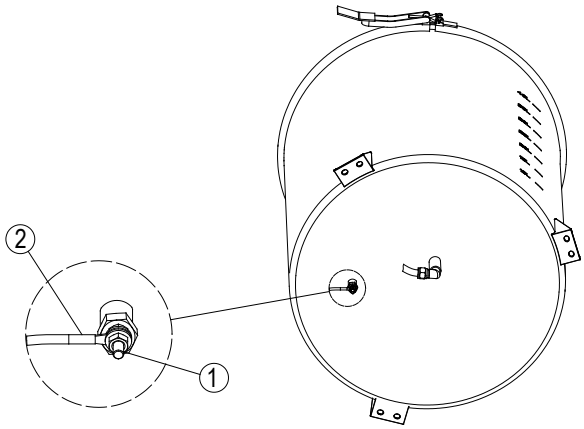


fig. 44

10.5 Flushing

10.5.1 Press the flushing button on the remote control, pump does not run:

- Check the 2 prerequisites for pump running
  - solution tank MUST be empty (tank empty light must be on);
  - flushing tank MUST NOT be empty (flushing light must be on)
- Check if the pump is defective
- Check if the control circuit board is defective

10.5.2 Solution tank is not clean after flushing:

- Is there a residue blockage at the flushing ball
  - remove the ball, use compressed air or pressurized water to blow from outside (fig. 45)

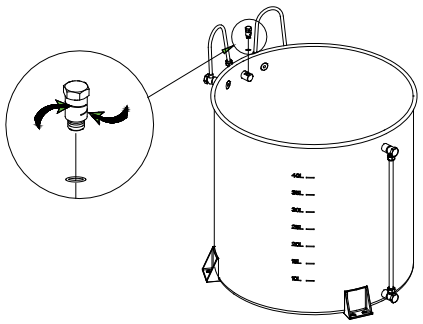


fig. 45

- Is the flushing tube or connection leaking or broken
- Is the water filter clogged

11. Storage

If the fogger will not be used for 30 days, please handle it as below. In winter time, these should be done after every use.

- Engine:
  Please refer to page 10 “Storage” of the engine Operator’s Manual.

- Solution system:
  To avoid crystallization of residues in the solution system parts, put approximate 0.5 l of resin-free oil (e.g. paraffin, diesel, heating oil) into the cleaned solution tank then fog until the tank is completely empty and no fog is coming out of the spray nozzle.

- Battery:
  Disconnect the minus pole (equipment ground).

- Fuel tank:
  Remove all the fuel from fuel tank.

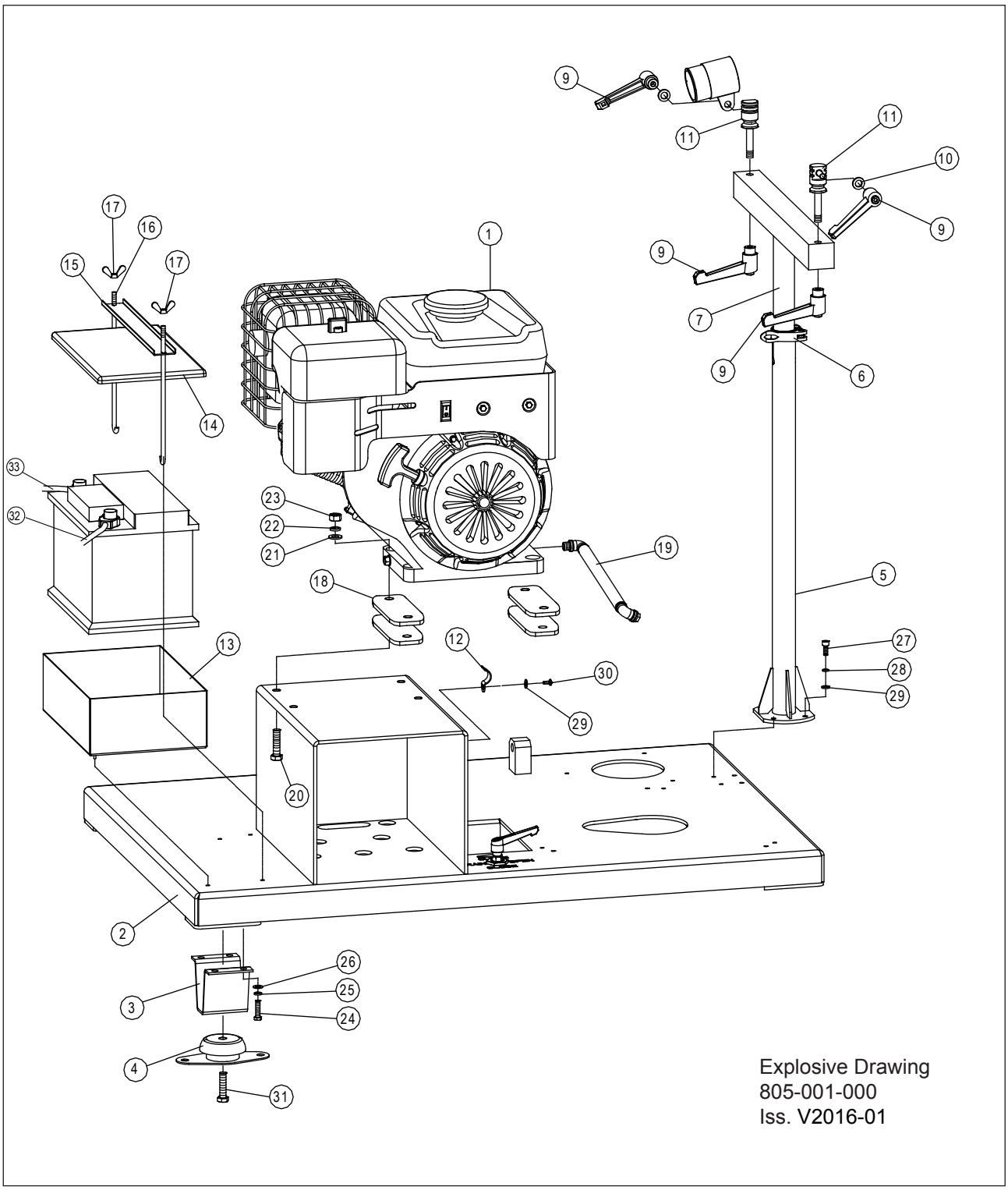
- Store the fogger in a clean and dry place out of the direct sun.

- In freezing winter, to avoid frosting, keep the fogger dry and indoor.

12. Explosive Drawing and Spare Part List

IMPORTANT: In case of order please give pos.no, part no. and part description.

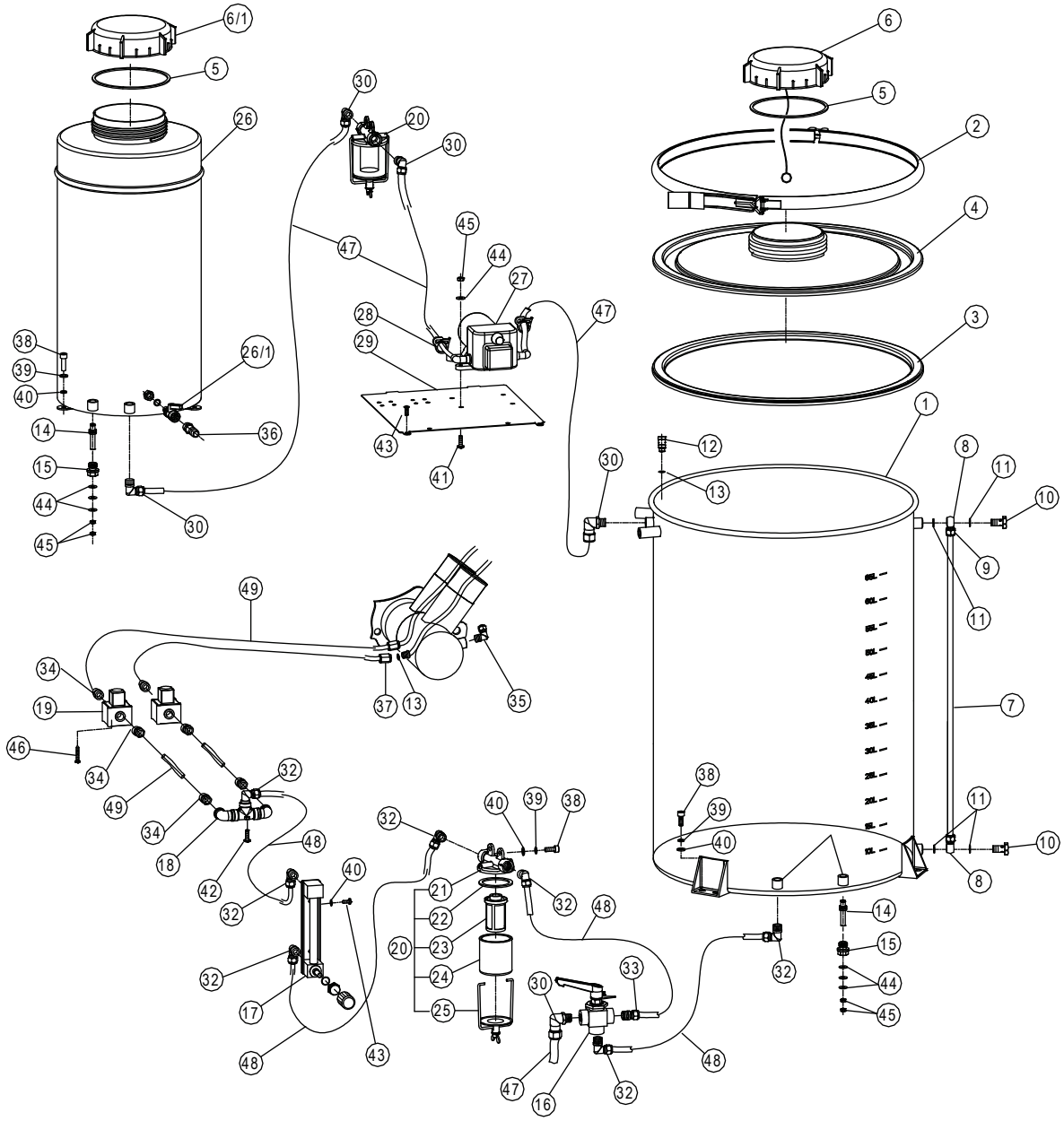
Chassis / Engine



Chassis / Engine
805-001-000

	805-001-000	Chassis/Engine
1	805-001-010	Briggs & Stratton Engine, Model: 25T2
2	806-001-020	Frame
3	806-001-030	Foot
4	806-001-040	Rubber Buffer
5	806-001-050	Support Base
6	806-001-060	Locking Clamp
7	805-001-070	Telescopic Pole, Nozzle Support Bar
9	807-001-090	Locking Lever, M8
10	806-001-100	Bush
11	806-001-110	Pillar, M8
12	806-001-120	Pipe Hanger
13	806-001-130	Tray
14	806-001-140	Holder Plate
15	806-001-150	Securing Plate
16	806-001-160	Holder Rod
17		Win Nut, M6
18	805-001-180	Isolation Plate
19	805-001-190	Drain Pipe
20		DIN 933 M 10x50 Hexagon Screw
21		DIN 125 B10.4 Plain Washer
22		DIN 127 B10 Spring Washer
23		DIN 934 M10 Hexagon Nut
24		DIN 933 M 8x20 Hexagon Screw
25		DIN 127 B8 Spring Washer
26		DIN 125 B8.4 Plain Washer
27		DIN 912 M6x16 Hexagon Socket Screw
28		DIN 127 B6 Spring Washer
29		DIN 125 B 6.4 Plain Washer
30		DIN 7985 M6x8 Fillister Screw
31		DIN 933 M 12x45 Hexagon Screw
32	806-004-180	Battery Wire with Pole Binder (+Plus)
33	806-004-190	Battery Wire with Pole Binder (-Minus)

Solution System

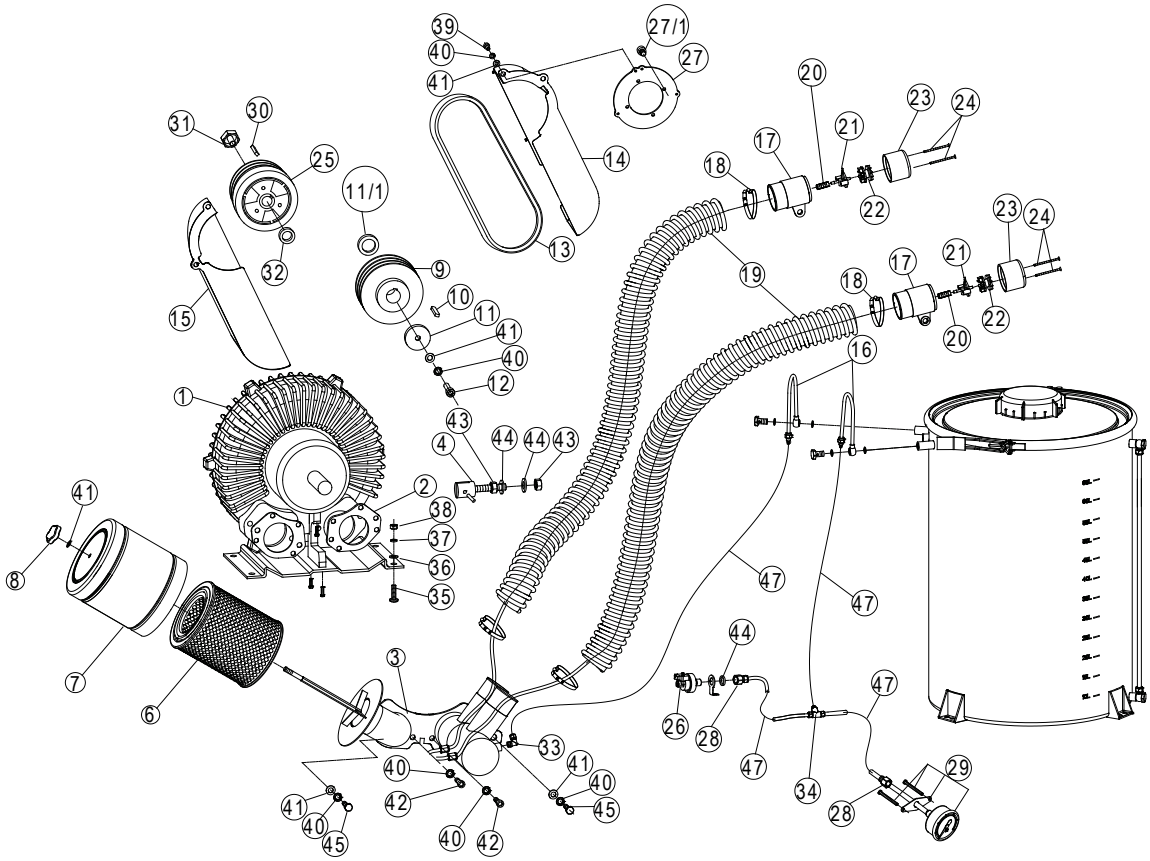


Explosive Drawing
805-002-000
Iss. V2016-01

Solution System
805-002-000

	805-002-000	Solution System
1	805-002-010	Tank 50 l
2	802-002-020	Cloure Ring
3	802-002-030	Cover Seal
4	806-002-040	Tank Cover
5	800-002-050	Cap Seal
6	806-002-060	Tank Cap
6/1	800-002-060	Tank Cap
7	805-002-070	Indicator Tube
8	800-002-080	Ring Tube Nipple
9		Retraing Nut, Ø 8XM11x1
10	909-137-000	Hollow Screw
11	909-118-000	Gasket
12	806-002-120	Cleaning Ball
13	935-41-000	O-Ring
14	806-002-140	Level Feeler
15	806-002-150	Sealing Screw
16	806-002-160	Solution Valve
17	805-002-170	Flow Meter
18	805-002-180	Solution Distributor
19	806-002-190	Solenoid Valve (V1-2)
20	802-005-020	Filter Assembly.
21	802-005-021	Filter Housing
22	800-005-022	Gasket
23	802-005-023	Filter
24	800-005-024	Glass Cup
25	802-005-025	Cup Holder
26	806-002-260	Flushing Tank, 15 l
26/1	601-003-000	Ball Valve G1/8"
27	806-002-270	Pump
28	806-002-280	Hose Clamp
29	805-002-290	Valve Suport Plate
30		Swivel Angle Screw Fitting Ø10xG1/4"
32		Angle Screw Fitting, Ø8xG1/4"
33		Straight Screw Fitting, Ø8xG1/4"
34		Straight Screw Fitting, Ø6xG 1/4"
35		Angle Screw Fitting, Ø6xG1/4"
36		Straight Screw Fitting, Ø10xG1/8" Cu
37		Retaining Nut, Ø6xM10x1
38		DIN 912 M6x16 Hexagon socket screw
39		DIN 127 B6 Spring Washer
40		DIN 125 B6.4 Plain Washer
41		DIN 7985 M4x16 Fillister Screw
42		DIN 7985 M4x12 Fillister Screw
43		DIN 7985 M4x8 Fillister Screw
44		DIN 125 B4.2 Plain Washer
45		DIN 934 M4 Hexagon Nut
46		Tapping Screw, ISO07049
47		Water Tube, Ø12 (2m)
48		Solution Tube, Ø8x1 (2m)
49		Solution Tube, Ø6x1 (2m)

Blower / Air System

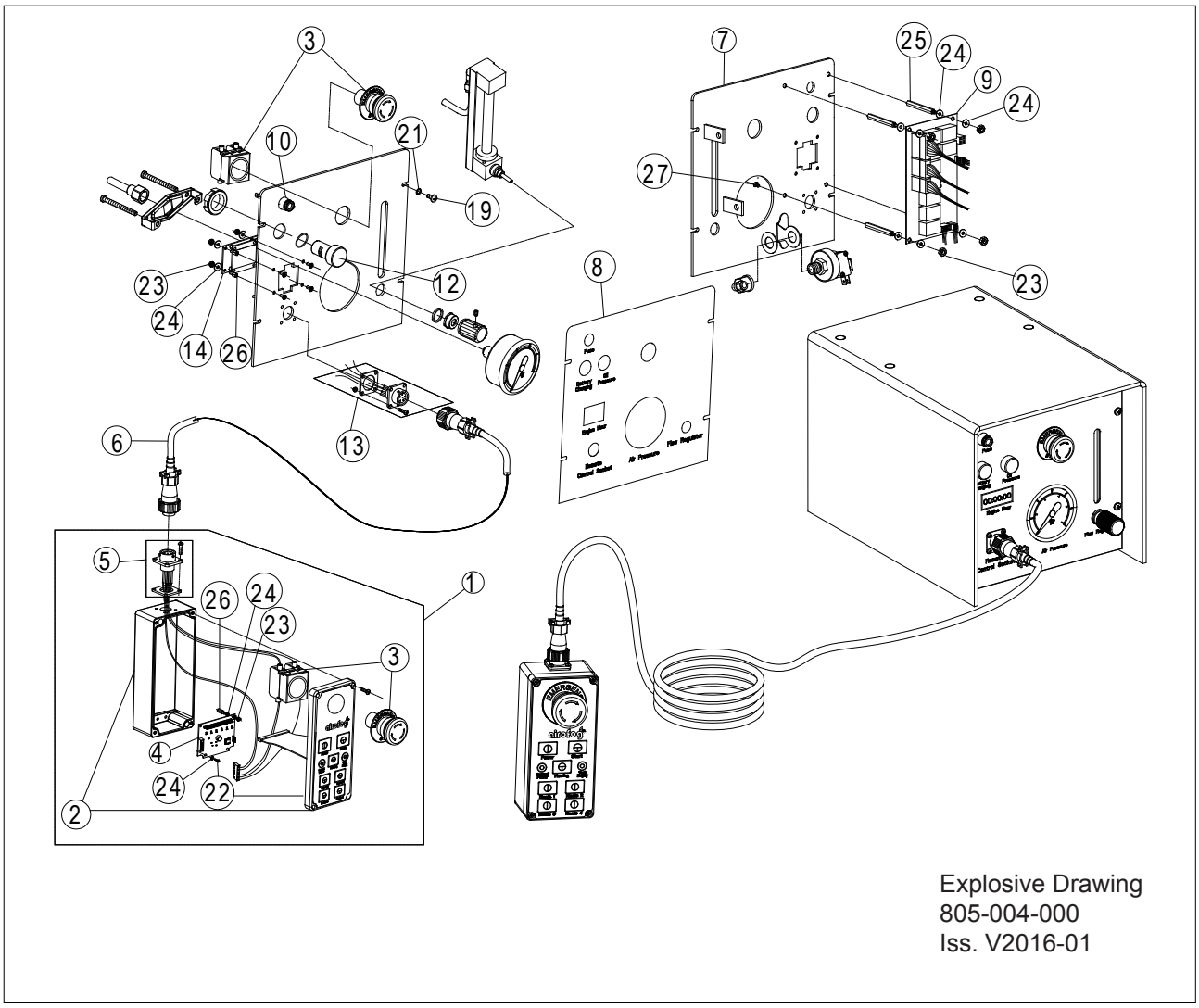


Explosive Drawing
805-003-000
Iss. V2016-01

Blower / Air System
805-003-000

	805-003-000	Blower/Air System
1	805-003-010	Side Channel Blower EHS-601 (M1)
2	800-003-020	Gasket
3	805-003-030	Air Inlet / Outlet Manifold
4	805-003-040	Tension Bolt
6	800-003-060	Filter Cartridge
7	800-003-070	Hood
8	800-001-130	Knob Nut M8
9	806-003-090	V-belt Pulley
10	805-003-100	Key
11	805-003-110	Disc
11/1	807-003-111	Spacer Ring
12		DIN 912 M8x20, Hexagon Socket Screw
13	805-003-131	V-belt
14	805-003-140	Belt Cover, Top
15	805-003-150	Belt Cover, Bottom
16	805-003-160	Pressure Pipe
17	800-004-020	Nozzle Holder
18	800-004-030	Hose Clamp
19	805-003-190	Air Hose, 130cm
20	240-017-010	Protective Spring
21	806-003-210	Nozzle
22	240-037-000	Diffusor
23	806-003-230	Nozzle Screen
24	240-043-000	Countersunk Screw
25	806-003-250	Centrifugal Clutch
26	806-003-260	Manometric Switch
27	805-003-270	Disc, Belt Cover
27/1	805-003-271	Set Screw
28		Straight Female Fitting, R1/4"xØ6
29	800-004-070	Manometer
30	807-003-300	Key
31	805-003-310	Set Screw
32	807-003-320	Spacer Ring
33		Angle Screw Fitting, Ø6xG1/4"
34		T-Fitting, Ø6
35		DIN 933 M10x30 Dise Screw
36		DIN 125 B10.4 Plain Washer
37		DIN 127 B10 Spring Washer
38		DIN 934 M10 Disc Hexagon Nut
39		DIN 912 M8x10 Hexagon Socket Screw
40		DIN 127 B8 Spring Washer
41		DIN 125 B8.4 Plain Washer
42		DIN 912 Hexagon Socket Screw M8x20
43		DIN 934 M10 Hexagon Nut
45		DIN 933 M 8x20 Hexagon Screw
46		Air Tube, PA12 Ø6x1

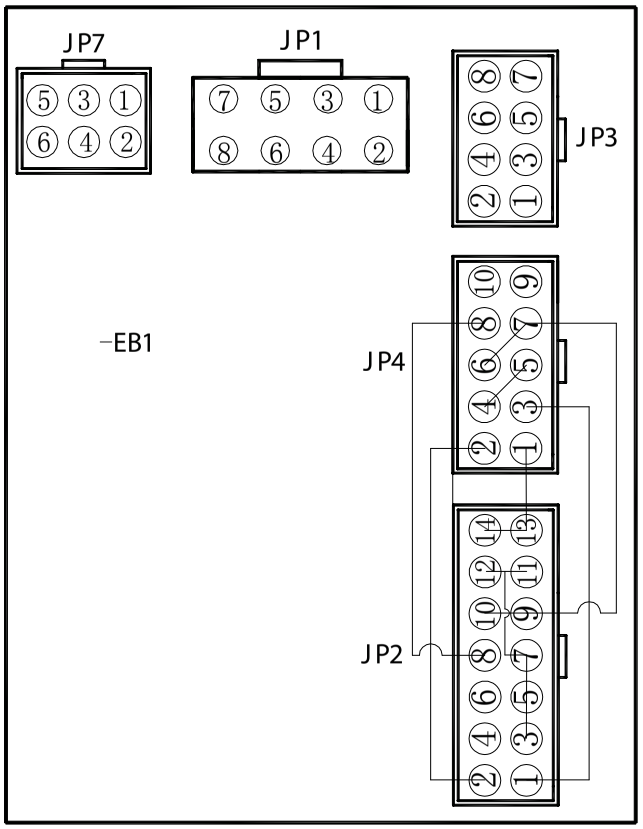
Electrical Installation

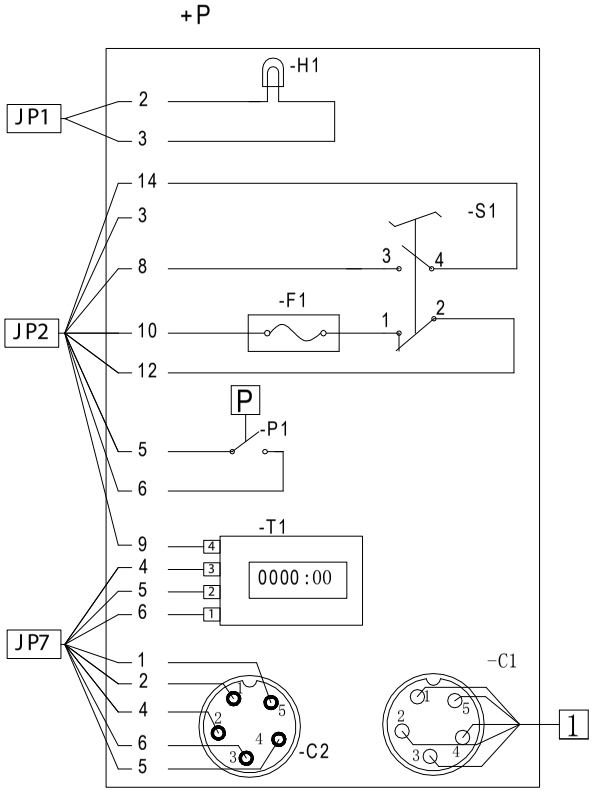


Explosive Drawing
805-004-000
Iss. V2016-01

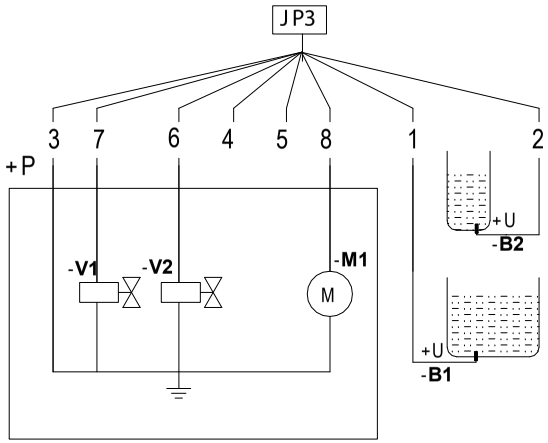
Electrical Installation
805-004-000

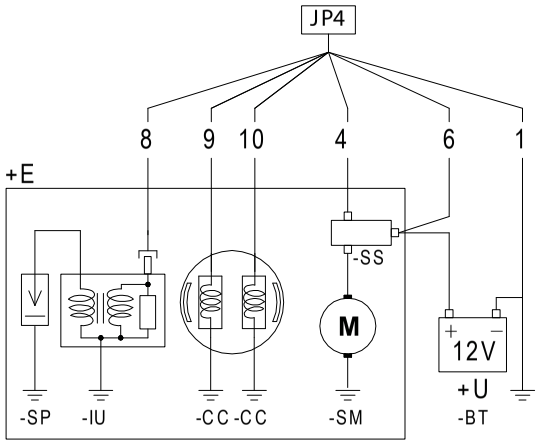
	805-004-000	**Electrical Installation**
1	806-004-010	Remote Control Assembly (1-5)
2	806-004-020	Control Panel (EB3)
3	806-004-030	Emergency Stop
4	805-004-040	Remote Control (EB2)
5	806-004-050	Socket Assembly
6	806-004-060	Cable with Plug, 5m
7	806-004-070	Front Plate
8	805-004-080	Front Plate Label, UM-2
9	806-004-090	Main PCB (EB1)
10	806-004-100	Fuse
12	806-004-120	Indicating Lamp "Green"
13	806-004-130	Socket Assembly
14	806-005-140	Hour Meter, LED
15	806-004-180	Battery Wire with Pole Binder (+Plus)
16	806-004-190	Battery Wire with Pole Binder (-Minus)
19		DIN 7985 M4x10 Fillister Screw
21		DIN 125 B4.2 Plain Washer
22		DIN 7985 M4x5 Fillister Screw
23		DIN 934 M3 Hexagon Nut
24	260-014-000	Washer
25		M4x60+6
26		M4x5+6
27		Countersunk Screw M3x8





	Location
+E	Engine
+U	Machine
+P	Control Box
+S	Remote Box
-T1	Running Hour Meter
-H1	LED Lamp
-S1	Engine/Emergency Stop
-S2	Engine/Emergency Stop
-F1	Fuse
-P1	Manometric Switch
-C1	Remote Control Cable
-C2	Socket at Control Box
-C3	Socket at Remote Box
-V1	Solenoid Valve
-V2	Solenoid Valve
-M1	Pump
-B1	Level Feeler
-B2	Level Feeler
-SP	Sparkplug
-IU	Ignition unit
-CC	Charging Coil
-SM	Start Motor
-SS	Start Solenoid
-BT	Battery
-EB1	PCB 1
-EB2	PCB 2
-EB3	PCB 3





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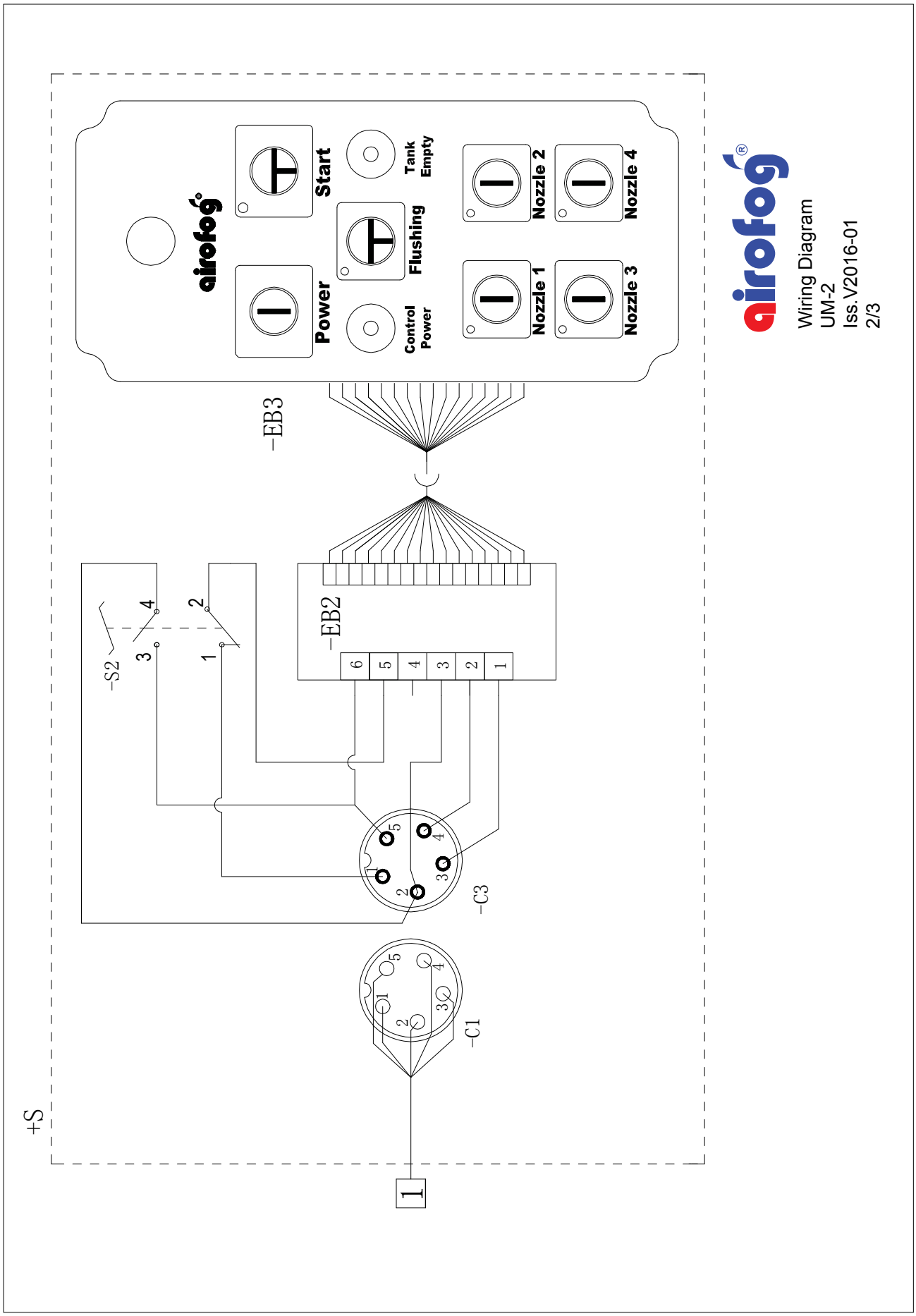
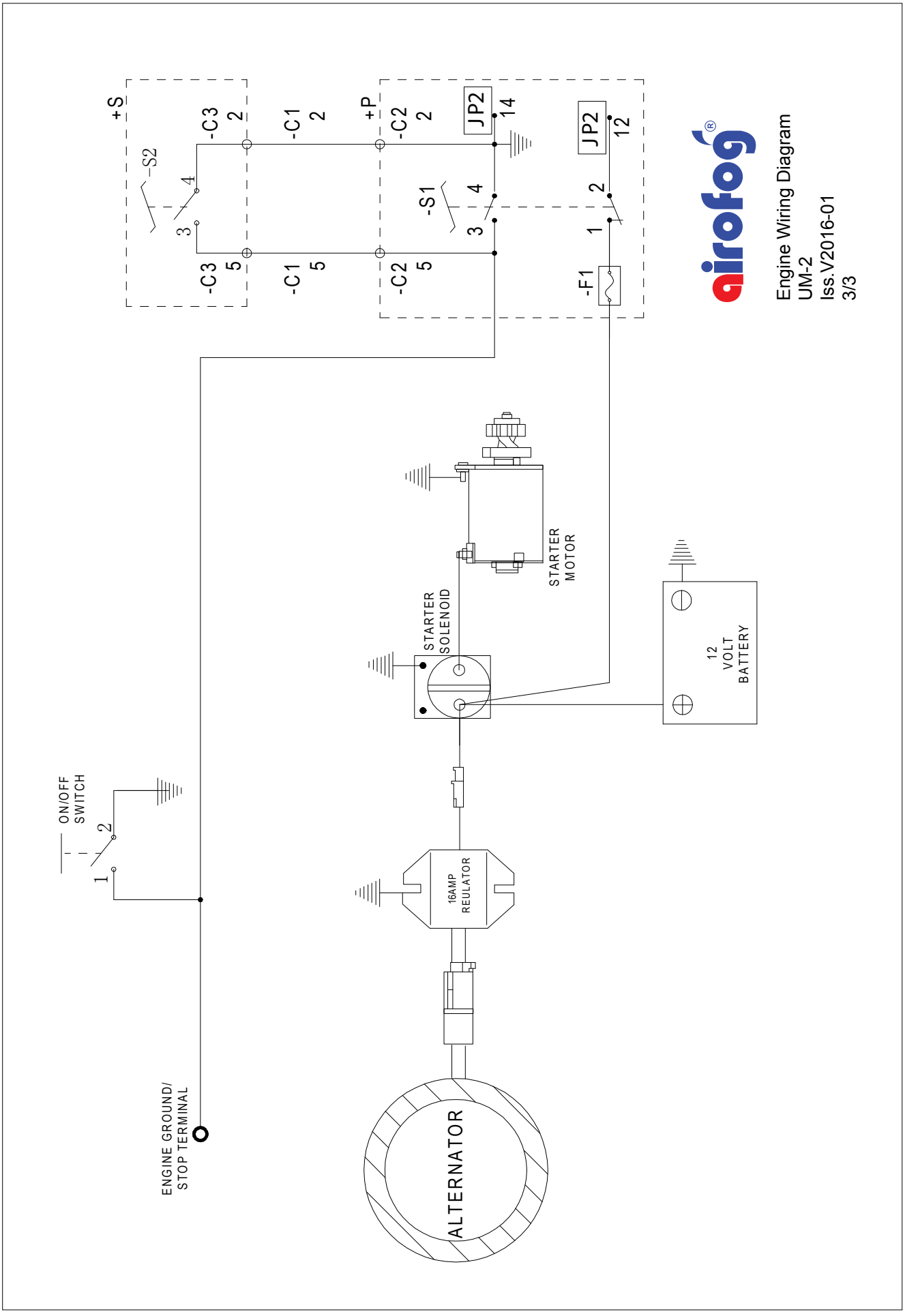
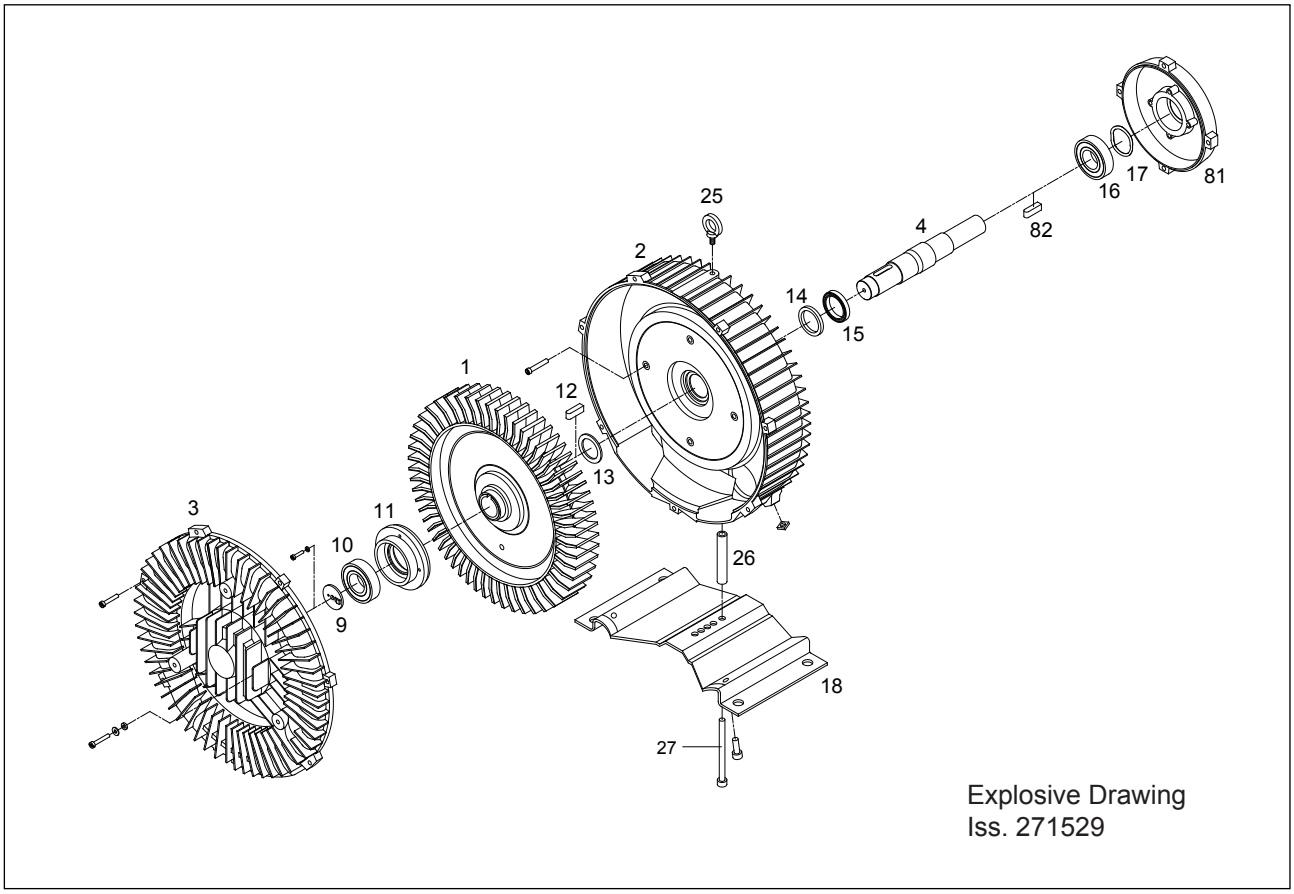
Wiring Diagram
UM-2
Iss.V2016-01
1/3


airofog
Wiring Diagram
UM-2
Iss.V2016-01
2/3
+S
1
-C1
-C3
-EB2
-EB3
-S2
Power
Start
Flushing
Control Power
Tank Empty
Nozzle 1
Nozzle 2
Nozzle 3
Nozzle 4


airfog®
Engine Wiring Diagram
UM-2
Iss.V2016-01
3/3
+S
-S2
-C3
2
4
3
-C3
5
-C1
2
-C1
5
+P
-C2
2
-C2
5
JP2
14
-S1
4
3
JP2
12
2
1
-F1
ON/OFF
SWITCH
2
1
ENGINE GROUND/
STOP TERMINAL
ALTERNATOR
16AMP
REULATOR
STARTER
SOLENOID
STARTER
MOTOR
12
VOLT
BATTERY

Side-channel Blower



1. impeller
2. blower housing
3. housing cover
4. shaft
9. end plate
10. front bearing
11. bearing seat
12. key
13. spacer ring
14. felt disc
15. oil seal
16. back bearing
17. dished spring
18. base plate
25. ring
26. support tube
27. bolt
81. back cover
82. key

Warning notes and safety regulations for lead-acid batteries

Follow information about the battery in the instructions for use and instructions for operating the vehicle.

Wear eye protection

Keep children away from acid and batteries.

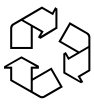
Explosion hazard:
A higly-explosive oxyhydrogen gas mixture occurs when charging batteries, therefore:

Fires, sparks, naked lights, and smoking are prohibited
- Avoid causing sparks when dealing with cables and electrical equipment, and be aware of electrostatic discharges.
- Avoid short-circuits.

Corrosive hazard:
- Battery acid is highly corrosive, therefore:
- Wear protective gloves and eye protection.
- Do not tilt battery, acid can escape from the degassing openings or vents.

First aid:
- Rinse off acid splashed in the eyes immediately for Several minutes with clear water, then consult a doctor immediately.
- Neutralize acid splash on skin or clothing immediately with acid neutralizer (soda) or soap suds and rinse with plenty of water.
- If acid has been drunk, immediately consult a doctor.

Warning note:
- Do not place battery in direct sunlight without protection
- Discharged batteries can freeze up, therefore store in a area free from frost.



Disposal:
- Hand in old batteries at a collection point.
  The notes listed under item 1 are to be followed for transport.
  Never dispose of old batteries as domestic waste.

1. Storage and transport
- Store dry and cool. Unfilled batteries have a very long shelf life.
- Recharge filled batteries when the acid density falls below 1.21kg/l\ (1.18 in the case of electrolyte 1.23)

- Only remove protective cap from positive post when connected in the vehicle and place on the pole of the battery which has been replaced to avoid short-circuits.

2. Commissioning
- Batteries supplied filled are ready for operation.
- Fill batteries supplies unfilled with sulphuric acid in accordance with VDE 0510 of density 1.28kg/l (for tropical countries 1.23kg/l) up to the max. acid level mark or 15mm above the upper edge of the plates.
- Battery and acid temperature should be above 10 centigrade if at all possible.
- After 15 mins, slightly tilt filled battry several times and top up acid if required.
- Lock in sealing plug securely, wipe off any acid splash.
- If starting performance is inadequate - recharge (see item 4.)

3. Installation in the vehicle.
- Switch off engine and all electrical equipment.
- Avoid short-circuits for example by tools.
- When removing, first disconnect the nagative post.
- Remove foreign bodies from the battery carrier and clamp battery tightly after installation.
- Clean terminal posts and clamps and other fixings and lubricate slightly with battery grease.
- When installing, first connect positive post and check post clamps for firm sealing
- Put on attachment parts such as post covers, degassing reservoir, elbow, hose connection and clamp holders from the battery which has been replaced
- If venting tubes have been fitted, place these tubes in the venting holes again.
- If only one venting tube has been fitted, the opposite venting hole has to be closed up with a vent plug. This vent plug has been cast on to the red cap from the positive terminal. Remove this vent plug and close up the open lateral borehole on the housing cover. This vent plug is not required for batteries without lateral boreholes.
- Leave at least one gas outlet open !
  This applies also to the return of old batteries.
- Elbow and plugs are available under item no.1183386002 and 1180522002, if required.

4. Charging
- Remove battery from the vehicle and be sure to disconnect the battery cables.
- Ensure adequate ventilation.
- Only use suitable direct current chargers.
- Connect positive pole of the battery to the positive output of the charger. Connect negative post appropriately.
- Only switch on charger after connection to the battery and switch off the charger first after charging.
- Charging current recommendation: 1/10 amperes of the battery capacity Ah
- If the acid temperature exceeds 55 centigrade, interrupt charging.
- The battery is fully charged when the acid density and the charging voltage have stopped rising for 2 hours.
- Check acid level and if required top up with distilled water. Never top up acid.

5. Maitenance
- Keep battery dry and clean.
- Check acid level regularly and replenish with distilled water. (In the event of considerable water consumption. Have the alternator voltage regulator checked)
- Do not use any so-called improving agents.
- If the acid density is below 1.21kg/l (1.18 in the case of electrolyte 1.23) recharge battery.

6. Jump starting
- Only use standard jump leads in accordance with DIN 72553 and follow their operating instructions.
- Only use batteries of same nominal voltage.
- Switch off both vehicle engines.
- First connect the two positive posts, then connect the negative post of the vehicle providing charging assitance. Then connect the negative crocodile clip to a bare metallic on the vehicle requiring assistance remote from the battery. (follow the vehicle providing assitance, then start the engine of the vehicle requiring assistance for a maximum of 15 seconds.
- Disconnect cables in reverse sequence.

7. Taking batteries out of service
- Charge battery. Store in a cool place and if the battery is to remain in the vehicle, disconnect negative terminal.
- Check battery state of charge regularly and correct by recharging if required (see item 4).

8. Warranty
We accept warranty for material and manufacturing defects which occurs within the applicable warranty period. Normal wear and tear, damage due to improper use, failure caused by external damage, and damage caused by openning the battery shall be expressly excluded from the warranty.
Valid warranty claims are usually met by providing a similar battery. Cancellation of sales and reduction of the purchase price shall be excluded, unless the replacement delivery does not remedy the defect.

Warranty services can be demanded only after presentation of battery subject to complaint and of the receipt.