VAN DER ENDE
POMPEN

User Guide Enbar LVM

Types 1U3 and 22U3

Version 20121206

Preface

This user guide has been compiled for users and installers of the Enbar L.V.M. 1-U3 and 22-U3.

Please read the entire user guide carefully and keep it in a safe place for future reference. In the event of loss or damage of this user guide (or a portion thereof) a new copy can be requested free of charge from the manufacturer for the entire lifespan of the system.

The user guide is divided into chapters, each of which consists of sections. Each of these can, in turn, be composed of various sub-sections.

The following items will be discussed in succession:

- General information
- Safety precautions (including an explanation of the symbols used)
- Description of the Enbar
- Installation and assembly
- Instructions for use
- Maintenance
- Repairs and malfunctions

Several appendices have been included at the back of the user guide, including exploded views of the filter and the nozzle.

The table of contents provides an overview of where each item can be found in the user guide.

Table of Contents

1. Identification

This chapter contains a number of general specifications, parameters and specifications with regard to the machine's intended operators, operating conditions, etc.

1.1 The Enbar L.V.M. U3

Enbar L.V.M. connection	400 V (230 V available)
Ventilator	230 V / 160 W / 0,71 A / 5 µF / 2650 rpm
Agitator mixer	230 V / 3.5 W / 60 rpm
Switch box	230 V / control current 24 VAC
Solution tank	5 l optional 10 l
Rinse water tank	1 l
Droplet size VMD	14 µm
Atomizing solution output	2.5 l / hr per nozzle
Oxygen output	+/- 90 l / min at 6 Bar
Compressor	
Type	N.300.50.R
Pump type	VE.01
Torque	18-20 N
Electric motor specifications	400 V / 1.5 kW / 3.45 A / 2800 rpm
Maximum pressure	10 Bar
Tank capacity	50 l
Oil	Puska VDL 100 or Shell Corena H100
Type plate and CE symbol	Front support or on a base plate, the CE symbol is located on the machine near the main box.

Table 1: Specifications

1.2 The machine

The Enbar LVM Low-Voltage Mister (or simply Enbar) is a machine that automatically disperses crop protection agents. The Enbar vaporizes the crop protection agents via an air stream, after which the vapour remains suspended in the treatment area for some time to ensure an even distribution and good permeation of the vaporized chemical solution into the crop.

The benefits of the ENBAR L.V.M.:

- Accurate and effective application of crop protection agents
- The crop does not become wet
- Very even distribution across the entire surface
- Mobile
- Available in a 400 V and a 230 V version
- Requires a minimum of labour
- Leaves practically no residue

The machine, generally speaking, is built up out of a ventilator, a nozzle, a motor, a solution tank, a frame, a compressor, and an oxygen tank.

The Enbar was developed exclusively for the atomization of crop protection agents in greenhouses (fogging). The 22-U3 and 1-U3 types described in this user guide distinguish themselves from other Enbar types (U1 and U2) in the sense that this type produces its own compressed air and is mobile.

According to the Low Voltage Directive, the Enbar is a Class I device.

1.3 Operators

It is imperative that all operators using the Enbar read this user guide and inform themselves of the applicable safety precautions before putting the machine into operation. All operators must be designated as authorized operators by the company.

An operator is not necessarily authorized to mix the atomizing agent or modify the settings of and/or execute maintenance and repair work on the machine, unless this person is at least eighteen years of age. Apart from this, operators must be certified to mix the atomizing solution through a valid Class III Spraying Certificate.

Operators must ensure that children or persons under the age of eighteen and persons not wearing adequate protective clothing in such cases when this is required stay out of the direct vicinity of the Enbar. Pregnant women should neither operate nor remain in the direct vicinity of the Enbar.

1.4 Connection instructions

Connect the Enbar to an earthed wall socket, protected with a 16A circuit breaker in combination with a 30mA earth leakage circuit breaker. The supply voltage of the mobile version of the Enbar (the 1-U3 and the 22-U3) is 400 V.

1.5 Use

The device may be used exclusively for the atomization of suitable crop protection agents.

1.6 Unintended use

It is not permitted to use the Enbar for atomization with substances other than crop protection agents.

Use of the Enbar and its solution tank as a storage unit for crop protection agents is prohibited. Never mix more atomizing solution than necessary; you should make only enough for one application only.

When the Enbar has completed the atomization and post-atomization ventilation process using the relevant crop protection agent, the tank must be emptied. Collect the atomizing agent in a container and store it in an adequate storage location.

The Enbar is not suitable for use as a ladder or a stepladder, or for any purpose other than atomization.

1.7 Atomization environment

The consumption of food, beverages or tobacco in the direct vicinity of the Enbar is prohibited due to the presence of crop protection agents.

The space where the Enbar is being used may not be entered when the machine is in operation.

Make sure that there is sufficient free space on all sides of the machine to avoid any possible safety hazards.

The ambient temperature must lie between 5°C and 40°C and the relative humidity between 35% and 85%.

The Enbar is intended for use in a crop growing area.

1.8 Warranty

The warranty is six months, commencing on the date of demonstrably taking the machine into commission, to which an expiration date applies of two years from the production date.
In the event that a warranty claim is lodged, the relevant parts must be offered to the manufacturer for assessment.

The warranty will be cancelled if any of the following conditions apply:

- Improper use or assembly
- Repeatedly ignoring the recommendations issued by the supplier and/or manufacturer
- Repair, maintenance or use by unauthorized parties
- Use of improper connections with regard to power supply or wiring
- Use of the machine in an unsuitable environment
- Deliberate damage or modifications to the machine

The guarantee terms are in accordance with the Terms and Conditions of the Netherlands Metal Association *(METAALUNIEVOORWAARDEN)* in the version dated January 2008.

2. Description

This chapter briefly explains the operation of the Enbar, while the location of the various parts is specified according to a number of schematic drawings.

2.1 Principle of operation

The Enbar L.V.M. (Low-Volume Mister) is a machine for the treatment of a specific space with vaporized crop protection agents that enables an even distribution and good permeation of the crop protection agents into the crop.

The machine injects a fluid crop protection agent into an air stream, after which the ensuing vapour is dispersed throughout the treatment area.

The general principle of operation is as follows (the numbers apply to the components in paragraph 2.2).

The solution tank (13) is filled with a crop protection agent. After the start sign has been given, the ventilator (12) will be switched on and the compressor (16) will ensure that the air pressure is brought to and kept at an adequate level. At the same time, the agitator mixer (6) in the solution tank will start to rotate to keep the crop protection agent dissolved and prevent it from clumping or precipitating. The ventilator will now start pre-ventilating to start up the air stream in the treatment area. Please note that the pre-ventilation time can be set.

There is a nozzle (2) with inputs for liquids and air directly in front of the ventilator outlet. Once the atomizing (or fogging) program starts, the air valve will switch and the compressed air will exit the oxygen tank (10) through the nozzle via the pressure regulator (8). This will result in negative pressure in the nozzle (the Venturi effect). This negative pressure causes the crop protection agent to be sucked up via the filter (4) and the excess flow valve (3) and subsequently vaporized at the nozzle head. As the nozzle is located in the air stream of the ventilator the crop protection agent is vaporized in the air stream and dispersed throughout the treatment area.

The Enbar will continue to atomize the treatment area for the duration of the set time. After this, the rinse cycle will start automatically. The water valve will switch to enable the water from the rinse water tank (11) to be vaporized. This will rinse the machine until it is clean. The rinse cycle takes approximately 3 minutes to complete. After rinsing, the post-ventilation cycle will commence (approximately 7 minutes) to ensure that any remaining droplets and moisture are dispersed.

All steps and components are controlled by a PLC (Programmable Logic Controller).

2.2. Parts

The diagram below identifies the key components by name and number.

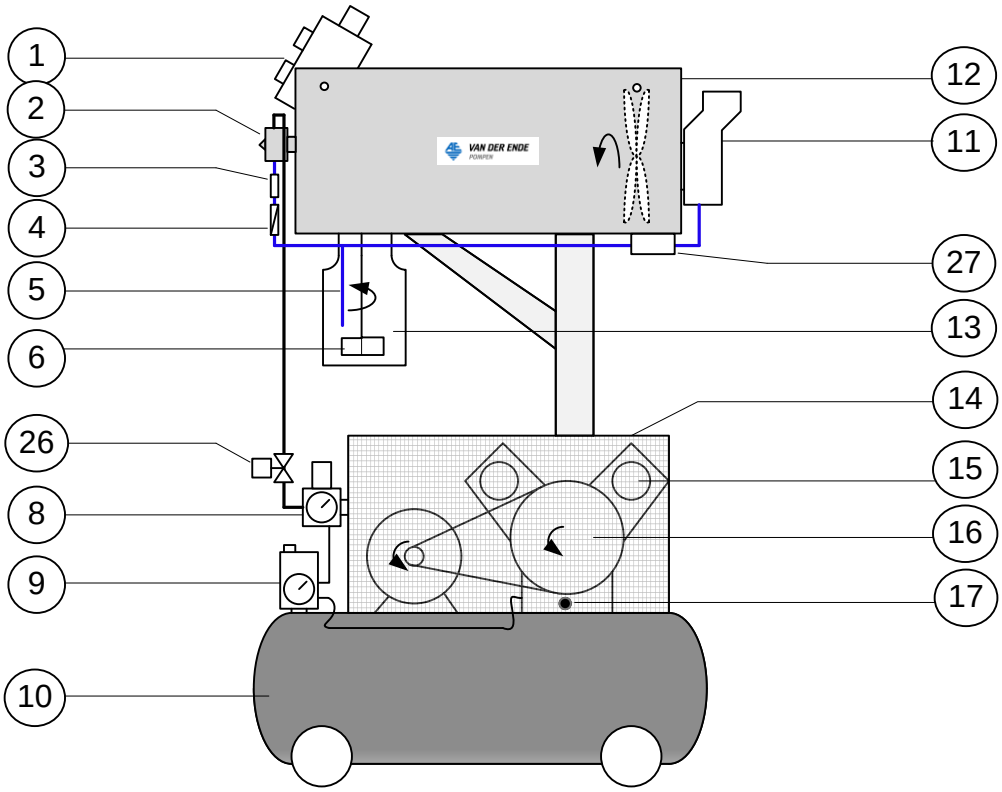


Figure 1. Parts of the Enbar U3

1.	Control unit
2.	Nozzle
3.	Excess flow check valve (woodpecker)
4.	Filter
5.	Suction tube
6.	Agitator mixer
7.	V-belt
8.	Pressure regulator (air pressure)
9.	Compressor pressure switch
10.	Compressor tank
11.	Rinse water tank
12.	Ventilator
13.	Solution tank
14.	Flywheel and drive mechanism protector
15.	Air filter (one on each cylinder head)
16.	Compressor block
17.	Oil drain plug
26.	Air pressure vent
27.	Junction box (with condenser, etc.)

Table 2: Parts of the Enbar U3

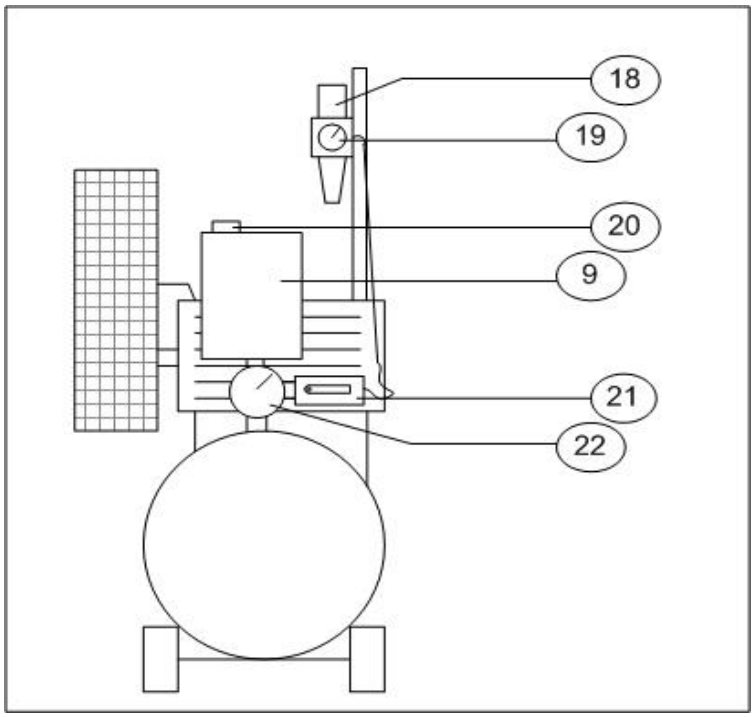


Figure 2. Parts of the Enbar U3

9.	Compressor pressure switch
18.	Air pressure regulation dial
19.	Pressure gauge (displays air pressure)
20.	Compressor ON/OFF switch
21.	Ball valve between buffer tank and Enbar
22.	Pressure gauge (displays pressure in buffer tank)

Table 3: Parts of the Enbar U3

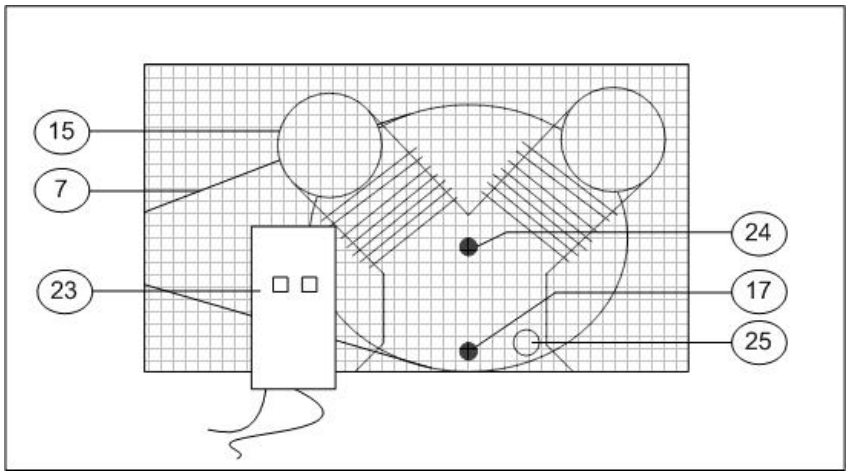


Figure 3. Parts of the Enbar U3

7.	V-belt
15.	Air filter
17.	Oil drain plug
23.	Motor overload switch (also compressor on/off switch)
24.	Oil refill opening
25.	Oil level gauge (with red dot indicating maximum level)

Table 4: Parts of the Enbar U3

2.3 Transport and storage

Before the Enbar can be moved every last remnant of the chemical solution must be removed from the solution tank.

The Enbar can be moved after the wheel blocks have been removed. The Enbar should only be wheeled across flat, stable surfaces to prevent any possibility of the machine tipping over.

After use, the Enbar must be stored in an area that cannot be accessed by unauthorized persons. Before storing, please ensure that the Enbar has been thoroughly rinsed and cleaned, if necessary (see paragraph 5.1). Leave enough water in the solution tank to cover the bottom to prevent the pipework and appendages from drying out.

3. Safety instructions

This chapter contains information about how to safely use the Enbar. Please read this chapter carefully and inform anyone working in the vicinity of the Enbar of all possible safety hazards and precautions.

3.1 Information about crop protection agents

The Enbar is used in combination with crop protection agents. These are deemed to be hazardous substances and are often toxic, irritants and/or hazardous to the environment.

Although the crop protection agents used by the Enbar are diluted, it is still essential that appropriate safety measures are taken.

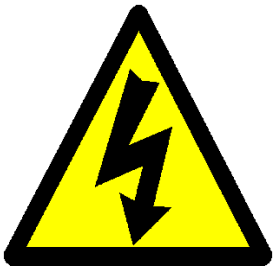
- Carefully read all labels for the applicable safety precautions!
- Ask your supplier for advice about the crop protection agents you wish to use.

Always wear a full face mask and gloves when using crop protection agents, diluted as an atomizing solution or otherwise! The person mixing the atomizing solution must have a spraying licence Class III (3). For an exhaustive list of the safety precautions associated with the use of the relevant atomizing solution, please refer to the label or ask your supplier.

Please keep in mind that the manufacturer of the Enbar is neither engaged in nor in any case responsible for the storage of the crop protection agents to be used. The operator of the Enbar is responsible for ensuring that adequate safety precautions are observed. The storage of the substances used does not fall within the scope of responsibility of the manufacturer.

3.2 Summary of safety hazard icons

There are various safety icons on the Enbar and in this user guide. Please refer to the list below for the meaning of these safety and warning icons and symbols.

Icon	Identifying mark	Definition
	**T**	This icon is used to designate a safety hazard associated with the use of toxic or hazardous substances. This icon prescribes the mandatory use of personal protection equipment, such as masks or gloves.
		This icon designates a safety hazard associated with hot surfaces.
		This icon designates a safety hazard associated with electrocution. Please observe the necessary safety precautions whenever you see this icon.
		Face mask When using a product that has this icon, always wear a full face mask to prevent the inhalation of hazardous substances via the respiratory system or exposure to these substances via the face.
		Gloves When using a product that has this icon, always wear gloves to prevent the exposure to and/or spreading of hazardous substances via the hands.

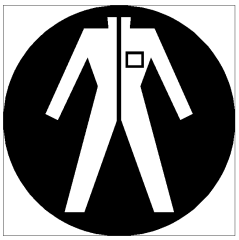
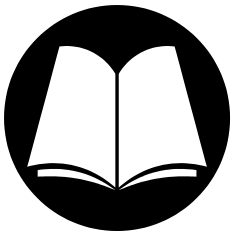
		Overalls When using a product that has this icon, always wear a protective overall or other type of protective clothing to prevent the exposure to and/or spreading of hazardous substances via the skin.
		User manual Always read the user manual before using a product that displays this icon.
		Hand-washing Always wash your hands after using a product that displays this icon.

Table 5: Relevant safety icons and their meanings

3.3. General safety instructions

Instructions with regard to the use and preparation of atomizing solutions containing crop protection agents:

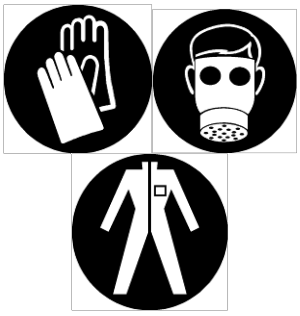
- This machine may be used only for the atomization of suitable crop protection agents.
- Please inspect the machine for damage and/or incompleteness directly upon taking it into receipt. You must notify the supplier and/or manufacturer immediately of any damage and/or incompleteness.
- Please read the entire user guide carefully before operating the machine.
- Please note that a spraying licence is required for the preparation of the atomizing solution.
- Consult the supplier of the crop protection agent for the correct dosages.

3.3.1 General information

- Avoid physical contact with the atomizing solution.
- Keep pregnant women and children under 18 away from the machine.
- Clean up any spills immediately.
- Never mix more atomizing solution than needed.
- When using the Enbar avoid touching your eyes, mouth and nose to the greatest extent possible.

- Avoid contact with cylinder heads; these can be hot during and after use.

- Ensure that all grills and protective covers are securely mounted.

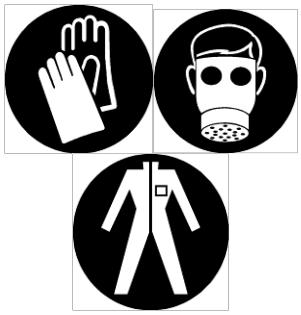


- Regularly replace gloves, protective clothing and full face mask filters.

- Ensure that everyone operating the Enbar or working in its direct vicinity is properly informed of the safety precautions.

- Always wash your lower arms and hands with soap and water after using crop protection agents.

3.3.2 Preparing the atomizing solution



- Wear protective clothing, gloves that fit well and a full face mask.

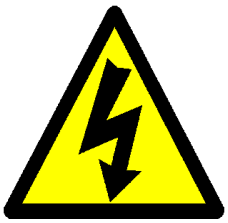
- Securely close the package after weighing off and/or measuring the crop protection agent.
- Securely store the package after weighing off and/or measuring the crop protection agent.
- The solution tank must be put back into place directly after filling it with the solution.

- Do not eat, drink, smoke or pick your nose.
- Always read the label first: other than instructions for use, labels also provide information concerning the statutory safety precautions, risk phrases (the 'R phrases') and safety recommendations.
- Always observe the R phrases on the label.

- Always wash your lower arms and hands with soap and water after mixing the atomizing solution.

3.3.3 Testing the installation

- Ensure that the solution tank is filled with nothing but **clean water**!



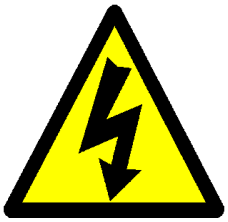
- Connect the Enbar to an earthed wall socket.

- Ensure that the wheel blocks are properly in place.
- Place the Enbar on a flat, stable surface.
- Ensure that the solution tank has been put into place correctly.
- Remove the key from the key switch after use.

3.3.4 Switching on the machine

- Make sure that nobody is present in the area to be treated.
- Take the necessary precautions to ensure that nobody can enter the treatment area while the Enbar is being operated.
- Inform all employees and other persons in the vicinity that the Enbar will be in use.
- Attach warning signs to the access doors of the area to be treated.

- Make sure that all windows and doors with outdoor access are closed to ensure that no vapour will escape.



- Connect the Enbar to an earthed wall socket.
- Follow all the instructions for connecting the machine.

- Ensure that the wheel blocks are properly in place.
- Place the Enbar on a flat, stable surface.
- Ensure that the solution tank has been put into place correctly.
- Make sure that the fans are blowing in a longitudinal direction (i.e. parallel) to the aisle.

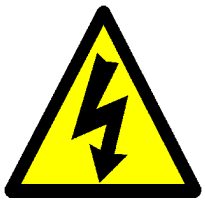
3.3.5 Using the machine

- Make sure that nobody can enter the space where the Enbar is being used.

- Make sure that all windows and doors with outdoor access are closed to ensure that no vapour will escape.

3.3.6 After using the machine

- Thoroughly air the treated area for several hours after use.
- Do not enter the area until the machine has completed the post-ventilation cycle and the area has been properly aired.
- Inspect the solution tank to ensure that it is empty and, if not, empty it. Treat the fluid as chemical waste.

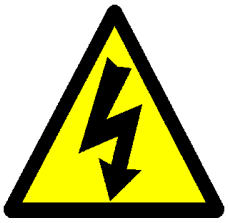


- Remove the plug from the wall socket.

- Store the Enbar in an area that cannot be accessed by unauthorized persons.

3.3.7 Maintenance and cleaning of the machine

- Ensure that the Enbar is completely empty of all crop protection agents before performing any maintenance or cleaning activities.



- Always remove the plug from the wall socket before working on the Enbar.

- Allow the cylinder heads to cool before cleaning them.

- Wear suitable protective clothing and gloves.

- Always wash your lower arms and hands with soap and water after using crop protection agents.

3.4. Summary of remaining risks

All users of this machine must be aware of the safety risks associated with its operation. Although these risks have been limited to the greatest possible extent by the manufacturer, failure to follow the instructions or improper use of the machine can result in safety hazards. We have provided an overview of the remaining risks and the consequences of ignoring the instructions or improper use of the machine.

Risk sheet No.	Description of remaining risks
1 and 2	The agents used, whether or not in combination with the operation of the machine (atomization, or fogging) are hazardous to the operator. As this safety hazard is an integral part of the operation of the machine it cannot be limited any further.
5.	The Enbar cannot be safely switched off once it has been put into operation. The safety hazards associated with this must be prevented by following the various safety instructions, such as meticulous inspection of the area to be treated before the fogging procedure is initiated.
7.	The solution tank must be put into place correctly to prevent any risk of leakage and/or loss of its contents.

Table 6: List of remaining risks

4. Operation

This chapter contains the instructions for the proper use of the Enbar. The numbers refer to the diagram in paragraph 2.2.

4.1. Controls

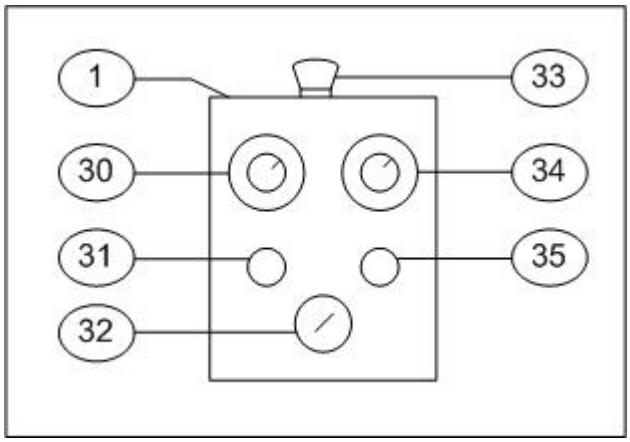


Figure 4. Controls of the Enbar U3

Number	Name	Function
1.	Control unit	Housing of the controls
30.	Pre-ventilation cycle settings dial	Setting the pre-ventilation cycle
31.	Start button	Starting the pre-ventilation cycle
32.	Key switch	Testing the machine with clean water
33.	Emergency stop button	Stopping the machine while a program is running
34.	Fogging cycle settings dial	Setting the duration of the fogging cycle
35.	Stop/reset button	Stopping and resetting the controls

Table 7: Designation of the controls of the Enbar U3

The compressor tank also has an ON/OFF switch (9) and an air pressure regulation knob (8).

Set times cannot be changed while a program is running (after the start button has been pressed). A program or cycle can only be interrupted by pressing the stop button. Pressing the **stop** button (35) will cause the Enbar to abort its program or cycle. Once the machine has been stopped the duration of the relevant cycle can be modified. If the stop button is pressed during the fogging cycle, which is in principle not possible since all persons are prohibited from entering the area being treated, the time elapsed will be set to **zero**. We therefore do not recommend pressing this button during a cycle and to do so only immediately after you have noticed that a setting is incorrect.

4.2 Putting the Enbar into operation

- Place the Enbar on a flat, stable surface.
- Place and aim the Enbar lengthwise to the central aisle.
    - Place and aim the Enbar parallel to the central aisle.
    - Place and aim the Enbar in such a way that the flow of air will move over the central aisle without touching the crop.
- Block the wheels of the Enbar with the wheel block system.
- Ensure that the plants to be treated are dry.
- Inspect the drain cock underneath the compressor tank to make sure that it is shut.
    - If it is open, shut it.
- Shut the ball valve between the buffer tank (10) and the pressure regulator (8).
- Connect the Enbar to a wall socket.
    - Ensure that this socket is earthed.
    - Make sure that the wall socket is protected with a 16A circuit breaker in combination with a 30mA earth leakage circuit breaker.
- Open the ball valve between the buffer tank (10) and the pressure regulator (8).
- Wait until the pressure gauge (22) on the buffer tank reaches 8 Bar.
- Turn the pressure regulator dial (18) until the pressure gauge on the pressure regulator reaches 6 Bar.

4.3 Pre-ventilation

- The ventilator of the Enbar automatically starts the pre-ventilation cycle when the Enbar is switched on. The minimum duration of the pre-ventilation cycles is 5 minutes. This can be set using the dial (30).
- Close all doors and windows with outdoor access.
- Switch on any auxiliary ventilators in the area to be treated.
- Allow the auxiliary ventilators to operate for 30 minutes before the fogging cycle starts.
- Allow the auxiliary ventilators to operate during the fogging cycle and for 15 minutes after the fogging cycle has stopped.

4.4 Filling and switching on the machine

Always wear gloves, protective clothing and a full face mask when preparing the atomizing solution!
Please note that a spraying licence is required to prepare the atomizing solution.

- Prepare the atomizing solution.
  - Follow the instructions provided by the supplier of the crop protection agents.
- Carefully unscrew and remove the solution tank from underneath the Enbar.
- Fill the solution tank.
  - Use a strainer to fill the solution tank.
- Put the solution tank back into place.
  - Screw the solution tank tightly shut.
- Fill the rinse water tank with water.
- Set the desired pre-ventilation cycle using the dial (30).
  - The minimum duration of the pre-ventilation cycle is 5 minutes.
- Use the dial (34) to set the desired fogging cycle duration.
  - Approximately 1 litre of atomizing solution is atomized per 30 minutes.
  - Always extend the fogging cycle by 15 minutes to ensure that every last bit of the atomizing solution is atomized.

- **Make sure that nobody is present in the area to be treated.**
- **Inform the staff whenever you will be using the Enbar to spray crop protection agents.**
- **Make sure that nobody can enter the area being treated.**

- Follow the safety instructions outlined in Chapter 3.
- Insert the key into the key switch (32).
- Switch on the machine by setting the key switch (32) to 'automatic' (anti-clockwise) and press the start button (31).
- The Enbar will start the pre-ventilation cycle and continue with the rest of the program.
  - The fogging cycle will start directly after the pre-set pre-ventilation cycle has been completed.
  - The light in the start button will blink throughout the pre-ventilation cycle.
- Once the fogging cycle has been completed the Enbar will automatically start the rinse cycle, followed by the post-ventilation cycle.
- The duration of the rinse cycle is 10 minutes,
  - The actual rinsing procedure takes 3 minutes.
  - After the rinse cycle the ventilator will run for another 7 minutes.
- The pressure switch (9) will automatically switch off the compressor.
- Ensure that the area that was treated is thoroughly aired for several hours.

4.5 Testing

Before testing, ensure that every last drop of chemical solution has been atomized and that the Enbar has been rinsed thoroughly.

Use only clean, potable water for testing purposes!

There are several ways to test the Enbar. If you encounter any problems please refer to Chapter 7 or contact the manufacturer.

4.5.1 Test atomization

- Insert the key into the key switch (32).
- Switch on the pressure switch (9).
- Open the ball valve (21) between the pressure switch (9) and the pressure regulator (8).
- Make sure the Enbar is connected to a power supply.
- Check the air pressure in the buffer tank (10) and on the pressure regulator (8).
  - Consult paragraph 4.2 if necessary.
- Turn the key clockwise.
  - The Enbar should now start atomizing (fogging).
- A spring mechanism will ensure that the key automatically returns to the neutral position.
- After this the machine will stop atomizing.
- Remove the key from the key switch (32) to prevent use by unauthorized persons.

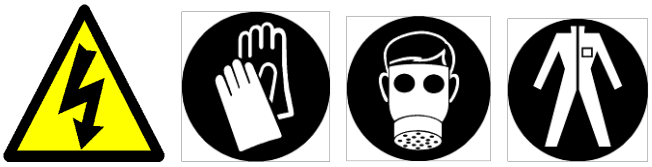
4.5.2 Test fogging + rinse cycle

- Insert the key into the key switch (32).
- Switch the key to 'automatic' (anti-clockwise).
- Make sure the Enbar is connected to a power supply.
- Check the air pressure in the buffer tank (10) and on the pressure regulator (8).
  - Consult paragraph 4.2 if necessary.
- Turn the pre-ventilation dial (30) to the 'Rinse Test' position.
- Turn the dial (34) to set the fogging cycle to 1 minute.
- Press the 'start' button.
  - The Enbar will now start its program.
  - The pre-ventilation cycle will be skipped.
  - After atomizing for 1 minute, the Enbar will start the rinse cycle.
- When the Enbar has completed its program, remove the key from the key switch (32) to prevent use by unauthorized persons.

4.5.3 Test full cycle

- Insert the key into the key switch (32).
- Switch the key to 'automatic' (anti-clockwise).
- Make sure the Enbar is connected to a power supply.
- Check the air pressure in the buffer tank (10) and on the pressure regulator (8).
  - Consult paragraph 4.2 if necessary.
- Turn the pre-ventilation dial (30) to 5 minutes.
- Turn the dial (34) to set the fogging cycle to 1 minute.
- Press the 'start' button.
  - The Enbar will now run through its full program (pre-ventilation, fogging and rinsing).
- When the Enbar has completed its program, remove the key from the key switch (32) to prevent use by unauthorized persons.

4.6 Taking the Enbar out of operation



Always wear gloves, protective clothing and a full face mask when switching off the Enbar or working on it!

Always disconnect the power supply first.
Close the ball valve that regulates the air supply!

4.6.1 Switching off the machine

Do not enter the area until the Enbar has completed the fogging and post-ventilation cycles and the area has been properly aired!

- Set the pressure switch (9) to '0' (OFF) by pressing the button (20).
- Switch the key switch (32) on the main box to '0' and remove the key from the switch.
    - This is to prevent use by unauthorized persons.

Remove the plug from the wall socket.

- Carefully unscrew and remove the solution tank (13) from the Enbar.
- Rinse the solution tank.
    - Rinse with warm tap water (40°C) until clean.
    - The rinse program ensures that the solution tank, suction pipe, excess flow check valve, pipework and nozzle are all rinsed with clean water.
- Leave a small amount of clean water to cover the bottom of the solution tank.
    - This will prevent the pipework from drying out.
- Screw the solution tank back into place.
- Fill the rinse tank (No. 11 in paragraph 2.2) with clean water.
- Drain the condensed liquid from the pressure vessel.
    - Put a container underneath the drain cock.
        - Please note that the condensed liquid is sprayed from the pressure vessel under a slight pressure.
    - Open the drain cock.
    - Collect the condensed liquid.
        - Treat the condensed liquid as chemical waste (it contains oil).
    - Shut the drain cock.

4.6.2 Storing the Enbar

- Store the Enbar where it cannot be accessed by unauthorized persons.

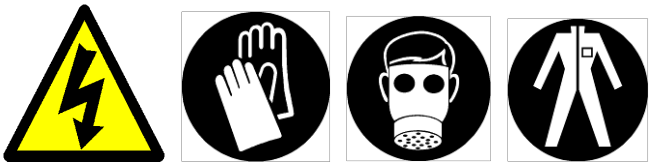
4.7 Restarting the Enbar after an emergency stop or power cut

In the event of a power cut (resulting from a power failure or pressing the emergency stop button) the Enbar will **not** resume its program automatically.

- Investigate the cause of the power cut or emergency stop.
- Resolve the cause of the power cut.
- Make sure that nobody is present in the area to be treated.
- Press the start button.
    - The Enbar will now run a 5-minute pre-ventilation cycle and resume its program.

5. Maintenance

This chapter describes the maintenance to be carried out on the Enbar. All the maintenance tasks described herein may be performed by the operators. All other maintenance tasks must be performed by a specialized maintenance professional.



Always wear gloves, protective clothing and a full face mask when working with the Enbar!

Always disconnect the power supply first!
Close the ball valve that regulates the air supply!

5.1. Cleaning after use

- After the fogging cycle has been completed the solution tank, suction pipe, excess flow check valve, pipes and nozzle are all rinsed with water.
- Unscrew the solution tank from the unit.
- Rinse the solution tank.
  - Rinse with warm tap water (40°C) until clean.
- Leave a small amount of clean water to cover the bottom of the solution tank.
  - This will prevent the pipework and other parts from drying out.
- Put the solution tank back into place on the fogging unit.
- Fill the rinse water tank with clean water.
- Clean the fogging unit and the compressor.
  - Use a non-abrasive household cleaning agent.
- Inspect the Enbar for leaks and wear and tear of the tubes and cables.
- Inspect all guards and/or grids.
- Inspect all couplings, bolts and nuts.

5.2 Compressor maintenance

5.2.1 Draining condensation fluids

Drain the pressure vessel after every use!

- Place a container underneath the drain cock.
- Open the drain cock.
- Collect the condensed liquid and treat it as **chemical waste** (it contains oil).

5.2.2 Oil level

- Check the compressor's oil level.
- The oil level should be between the red dot on the oil level gauge and the bottom of the oil level gauge.
- The red dot indicates the maximum level.
- Refill the oil if necessary (see 5.2.3).
- Use only Puska Alteroil VDL 150.
- This can be obtained from your supplier and/or the manufacturer.

5.2.3 Refilling and replenishing the oil

The oil should be replenished after every 500 operating hours or once every 6 months.

- Unscrew the oil filler plug (24) from the carter.
- Place a container underneath the oil drain plug (17).
- Open the oil drain plug and collect the oil.

Treat the used oil as chemical waste!

- Clean the oil drain plug.
- Screw the oil drain plug back into the carter.
- Fill the carter with oil through the fill opening.
    - The maximum level is indicated by the red dot on the oil level gauge.
    - The minimum level is the bottom of the oil level gauge.
- Screw the oil filler plug (24) back into the carter.

5.2. Air filters

After it has been used five times the Enbar's air filters must be cleaned.

Always wear gloves, protective clothing and a full face mask when cleaning the air filters!

- Open the air filter body (15) by unscrewing the cover (bayonet catch).
- Blow pressurized air through the filters.

Please be careful: chemical solution particles may be released from the filters. Make sure that everyone in the vicinity is wearing personal protective equipment!

- Put the air filters back.
- If they are very dirty the air filters must be replaced.

6. Annual overhaul

6.1 Safety instruction

Always wear gloves, protective clothing and a full face mask when working on the Enbar!

Always disconnect the power supply first!
Close the ball valve (21) that regulates the air supply!

Never switch on the ventilator(s) if the ventilator guard is not in position!

6.2 Fogging unit

- Disconnect the power supply.
- Close the ball valve (21) that regulates the air supply.

- Drain condensed fluid and deaerate the pressure vessel.
  - Put a container underneath the drain cock.
  - Open the drain cock.
  - Leave the drain cock open until barely any air escapes from the drain cock.
  - Shut the drain cock.

- Clean the ventilator blades.
  - Remove the ventilator guard from the ventilator(s).
  - Clean the ventilator blades with soapy water.
  - Put the ventilator guard back into place.

- Clean the solution tank (6).
  - Wipe the tank clean with a moist cloth.
  - Rinse it with plenty of clean water.
  - Clean the tank with soapy water if necessary.

- Inspect the agitator mixer (5).
  - Switch on the Enbar via the main switch box.
  - Connect the plug to the wall socket.
    - The agitator mixer should now being to rotate slowly.
    - If the agitator mixer does not function properly contact the supplier.
  - Remove the plug from the wall socket.
  - Switch off the Enbar via the main switch box.
  - Put the solution tank back into place.

- Clean the filter in the suction line (3).
  - Take the suction filter apart.
    - Use the exploded view in the appendix for reference.
  - Rinse the filter.
    - Rinse with warm tap water (40°C) until clean.
  - Put the filter and any sealing rings (O-rings) back into place in the pipework.

- Clean the nozzle (1).
    - Take the nozzle apart.
        - Use the exploded view in the appendix for reference.
    - Check the nozzle for wear and tear.
    - Replace the nozzle with the one included in the repair kit or replace the same nozzle.

- Check the capacity of the nozzle (1) and the flow limiter (2).
    - Fill the solution tank (6) with 200 cc (= 200 ml) clean water.
    - Test the machine.
        - Refer to the instructions in paragraph 4.5.
    - Use a watch or stopwatch to check the duration of the fogging cycle.
        - The tank should be empty in 6 minutes.
    - If the tank empties too quickly the nozzle should be replaced. If this happens too slowly the flow limiter and the nozzle must be cleaned or replaced.

- Check the fogging unit's rinse cycle
    - Refer to paragraph 4.5.2.

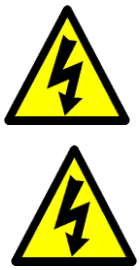
- Clean the machine.
    - Clean the fogging unit and the compressor.
        - Use a non-abrasive household cleaning agent.
    - Inspect the Enbar for leaks and wear and tear of the tubes and cables.
    - Inspect all guards and/or grids.
    - Inspect the couplings, bolts and nuts.
    - Leave a small amount of clean water to cover the bottom of the solution tank.
        - This will prevent the pipework and other parts from drying out.

6.3 Compressor

Have the compressor checked every year by your service centre or supplier. This is essential to prolonging the Enbar's service life and maintaining the operational security of the compressor.

7. Malfunctions

Problem	Cause	Solution
1. The compressor will not start.	No power supply	Make sure that the plug is connected to the wall socket. Check to see of the power supply is functioning by briefly running the fogging cycle (see paragraph 4.5.1).
	The compressor has already attained the desired pressure.	Check the pressure gauge on the tank. Cut-off pressure is approximately 8.5 Bar.
	The pressure switch is not on.	Turn the switch of the pressure switch (20) first to 'O' and then to 'I'.
	The motor protection has been shut off due to overload, mismatched loads or short circuiting.	Check the setting of your motor protection switch and contact your supplier.
	Defective fuse in the power supply	Check the fuse of the group to which the Enbar is connected.
2. Compressor The speed at which the compressor is operating is too low.	The pressure relief valve does not function properly.	Contact your supplier.
3. The ventilator(s) are not functioning properly.	The fuse in the main box is defective.	**Remove the plug from the wall socket.** Replace the fuse. If the fuse blows once more, contact your supplier.
	The fuse in the box on the fogging unit is defective.	**Remove the plug from the wall socket.** Replace the fuse in accordance with the instructions in the appendix. If the fuse blows once more, contact your supplier.
4. The fogging cycle does not function properly, but the unit is blowing out air.	There is no fluid; the suction pipe is clogged or has been broken off.	Remove the tube from the pipe. Rinse thoroughly or replace.
	The flow limiter is clogged.	Remove this part, including the tubes, and replace them.
	The nozzle is clogged.	Carefully take the nozzle apart and clean the parts, **without filing or scouring!**
	The nozzle gasket is leaking.	Take the nozzle apart and replace the gasket.
	The suction filter is clogged.	Take the filter apart. Rinse until clean.
	The suction filter seal leaks.	Take the filter apart and replace the seal.



Problem	Cause	Solution
5. The fogging cycle does not work, and the unit is not blowing out any air.	The magnet valve is defective.	Contact your supplier.
	The fuse in the switch box is defective.	**Remove the plug from the wall socket** before you check the fuse. Contact your supplier.
	The stop cock for the air supply on the tank is shut.	Check the setting of the stop cock for the air supply.
	The dial of the pressure regulation valve is shut.	During the fogging cycle, turn the dial until the pressure gauge of the regulation valve until it reaches 6 Bar.

Table 8: Possible malfunctions and solutions

If you are having the Enbar repaired you must ensure that all tanks have been emptied and thoroughly rinsed.

8. Technical specifications

8.1 Enbar mobile

Model		**22-U3**	**1-U3**
Dimensions	L	980 mm	1090 mm
	B	855 mm	610 mm
	H	1285 mm	1580 mm
Weight		127 kg	112 kg
Supply voltage		400 V	
Frequency		50 Hz	
Rated current		3.8 A	

Table 9: Technical specifications Enbar mobile

8.2 Compressor

Type		Puska N300-50
Pump type		VE.01
Motor	Voltage	400 V (230 V optional)
	Capacity	1.5 kW
	Power supply	3.45 A
	RPM	2850 / min
Maximum pressure		10 Bar
Tank volume		50 l
Compressor oil type		Puska VDL150
Type plate on the front support or base plate		

Table 10: Technical specifications compressor

8.3 Enbar unit

Type		**U 3**
Ventilator(s)	Voltage	230 V
	Capacity	160 W
	Power supply	0.71 A
	Condenser	5 µF
	RPM	2650 / min
Agitator mixer	Voltage	230 V
	Capacity	3.5 W
	RPM	60 / min
Solution tank volume		5 l (10 l optional)
Rinse tank volume		1 l
Atomizing solution output		2.5 l / hr per nozzle
Air output per unit		90 l / min at 6 Bar

Table 11: Technical specifications Enbar in general

CE symbol on the machine near the main box

9. Declaration of Conformity

EC Declaration of Conformity
(in accordance with Appendix IIA of the Machine Directive 2006/42/EC)

We, Van der Ende Pompen B.V.
Maasambacht 4
2676 CW Maasdijk
The Netherlands,

declare, entirely under our own responsibility, that the following machine:

the Enbar LVM
Models U1, U2, 1-U3 and 22-U3,

to which this statement refers, is in conformity with the provisions of the following Directives:

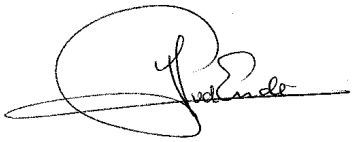
Machinery Directive (2006/42/EC)
Low Voltage Directive (2006/95/EC)
EMC Directive (2004/108/EC)

and (in this case) in accordance with the following standards or normative documents:

N/A.

The Netherlands
Maasdijk
17 August 2009

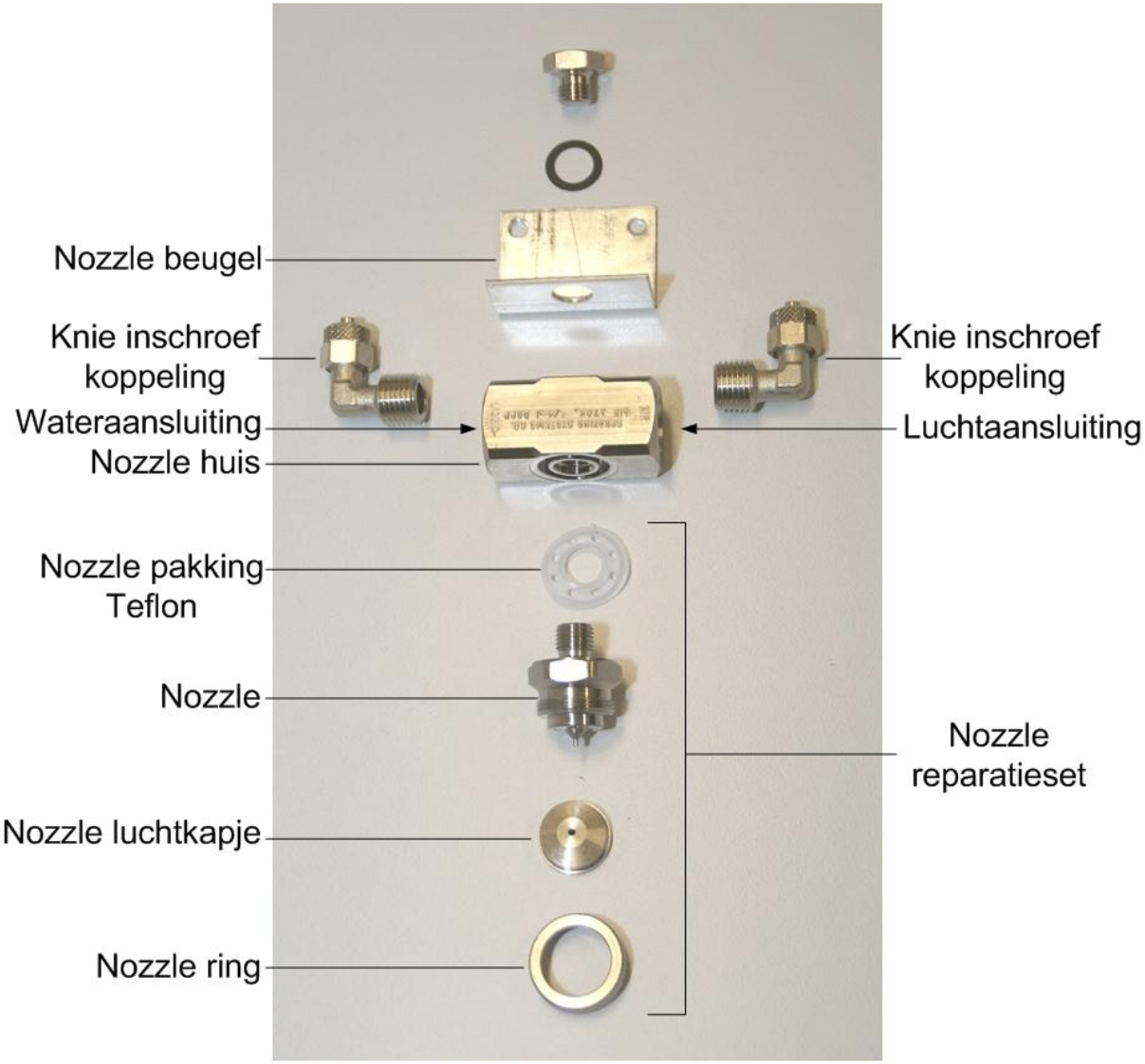
P.J. van der Ende



Appendices

- **Exploded view nozzle**
- **Exploded view fluid filter**
- **Replacing a fuse in the U3**
- **Time diagram**

*Composition of the nozzle**



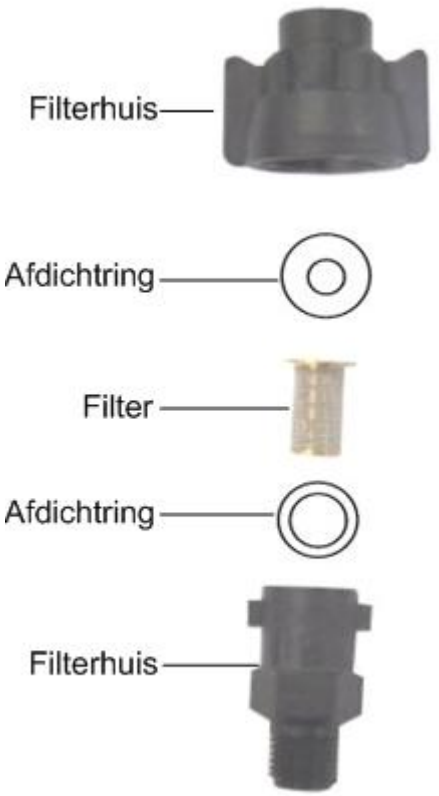
The nozzle bracket, the nozzle casing, the nozzle gasket and the male knee connectors can be ordered individually from the manufacturer. A Nozzle Repair Kit, containing a nozzle gasket, nozzle, nozzle air cap and nozzle ring can be ordered from the manufacturer. Out of the parts in this kit only the gasket can be ordered separately.

The words 'liquid' and 'air' have been engraved in the nozzle casing to designate the inputs for liquids and air, respectively.

The top-most bolt (to attach the nozzle bracket to the casing) is secured with green Loctite® and cannot be removed after assembly.

*Legend: Nozzle beugel = Nozzle bracket
Nozzle pakking = Nozzle gasket
Wateraansluiting = Water input
Nozzle luchtkapje = Nozzle air cap
Knie inschroef koppeling = Male knee connector
Lucht aansluiting = air input
Nozzle huis = Nozzle casing
Nozzle reparatieset = Nozzle repair kit

Composition of the inlet filter*



*Legend: Filterhuis = Filter body Afdichtring = Sealing ring (O-ring)

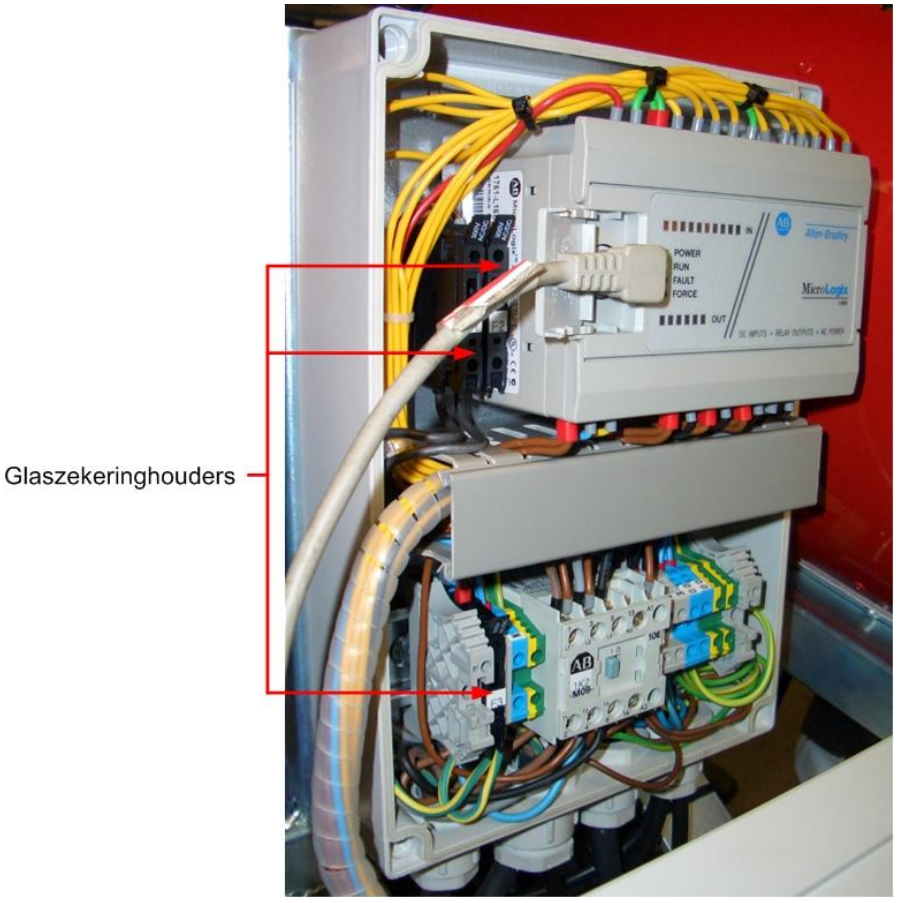
Replacing a fuse in the U3

If there is any suspicion of a fuse having been blown in the control unit of the fogging unit this must be tested or replaced immediately. Follow the instructions below.

Before any maintenance work is done on the Enbar, make sure that the compressed air ball valve (21) is shut and that the machine is unplugged!

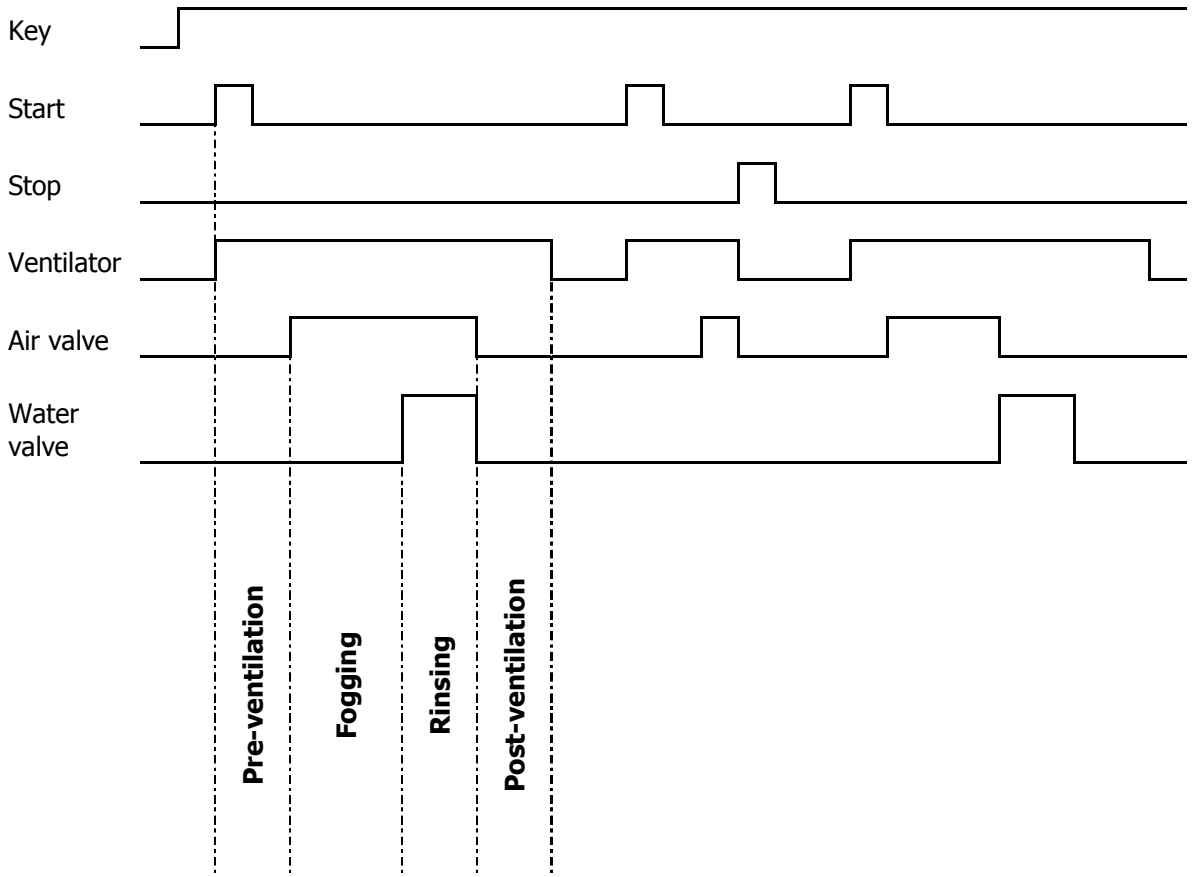
Make sure that you can perform your work safely and securely. In case of doubt, consult an expert or contact the manufacturer.

- Open the control unit.
  - Unscrew each of the four corner 4 screws.
- Remove the cover.
  - This is connected to the electronic parts with cables.
  - Do not remove these cables!
- Pull back the tab of the glass fuse holder.
  - The U3 has three glass fuse holders, as shown in the diagram below.
- Test the glass fuse or replace immediately.
  - The glass fuse type is rated 4A (fast-acting).
- Clamp the glass fuse holders shut.
- Screw the cover back into place.



Legend: Glaszekeringhouders = Glass fuse holders

Time diagram



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Van der Ende Pompen B.V. · PO Box 10, 2676 ZG, Maasdijk · Maasambacht 4, 2676 CW, Maasdijk, the Netherlands · Telephone +31(0)174 515050 · Fax +31 (0)174 514848
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