

B100 Restrain Generator

DEVICE COMMERCIAL

For use only by Restrain trained operators. B100 Restrain Generator is a proprietary delivery device which produces ethylene gas from Restrain Fuel upon activation within the device.

Only use Restrain Fuel for the B100 Restrain Generator

READ THE LABEL AND OPERATING MANUAL BEFORE USING KEEP OUT OF REACH OF CHILDREN PREVENT ACCESS BY UNAUTHORIZED PERSONNEL

REGISTRATION NO. 34153
PEST CONTROL PRODUCTS ACT

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GENERAL INFORMATION:

The intended use of the B100 Restrain Generator is for the conversion of Restrain Fuel to ethylene gas to accelerate ripening in greenhouse tomatoes. The B100 Restrain Generator has been developed to produce the recommended level of ethylene gas for use in greenhouse tomatoes. The B100 Restrain Generator uses Restrain Fuel at three settings: 1.44 L/24 hours, 2.88 L/24 hours and 4.32 L/24 hours to produce the required concentration of ethylene gas based on the area of the greenhouse. The B100 Restrain Generator Operators Manual provides the use directions for the B100 Restrain Generator. The B100 Restrain Generator is to be used only indoors under controlled conditions.

SAFETY AND HANDLING:

PRECAUTIONS

KEEP OUT OF REACH OF CHILDREN

FLAMMABLE – Highly flammable liquid and vapour. Extremely flammable gas. Keep away from heat/sparks/open flames/hot surfaces. No smoking.

Avoid breathing gas.

May cause drowsiness or dizziness.

Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove and wash contaminated clothing before reuse.

Prior to re-entry, ventilate areas after application either by opening windows and doors or using fans, where required, to aid in the circulation of air. Air exchange/ventilation systems confirmed to be operational may also be used.

Workers must wear a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes during application, clean-up and repair of B100 Restrain Generator. A respirator with a NIOSH-approved organic-vapour-removing cartridge with a prefilter approved for pesticides, or a NIOSH-approved canister approved for pesticides is required if levels of ethylene oxide are above permissible levels (ACGIH TLV - TWA 1 ppm).

Follow manufacturer's instructions for cleaning/maintaining personal protective equipment (PPE). If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove Personal Protective Equipment immediately after handing this product.
- Wash the outside of gloves before removing.
- As soon as possible, wash thoroughly and change into clean clothing.

FIRST AID

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give

artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control centre or doctor for further treatment advice.

Take container, label or product name and Pest Control Product Registration Number with you when seeking medical attention.

TOXICOLOGICAL INFORMATION

Treat symptomatically.

DIRECTIONS FOR USE:

CROPS, PESTS, APPLICATION RATES AND METHODS

GREENHOUSE TOMATO APPLICATION			
Crop	Ethylene Rate	Interval	Remarks
Greenhouse Tomatoes (Accelerated ripening)	1.75 mg/m ³ (0.0014 L/m ³) (1.4 ppm)	Apply at BBCH 81 – 89) for 4.5 days continuously.	 Monitor crops and commence application once the desired plant growth stage has been reached. Check the B100 Restrain Generator during operation to ensure the proper rate of ethylene gas is being generated continuously. Maintain an appropriate level of Restrain Fuel to ensure the proper delivery of the ethylene gas. Monitor greenhouse temperature and ventilation to ensure the appropriate dispersion of ethylene gas during application.

APPLICATION INSTRUCTIONS:

Follow all safety precautions and use directions listed in the B100 Restrain Generator Operators Manual for the correct unit placement. Follow all generator program prompts/settings for the application requirements.

Follow the instructions in the B100 Restrain Generator Operators Manual for proper use, maintenance and clean-up procedures.

GREENHOUSE TOMATOES

The B100 Restrain Generator should be located within the greenhouse (glass, plastic) that is being treated. This machine is not intended for use in temperatures below – 1.0 °C (30 °F).

Install the B100 Restrain Generator when crop has reached the desired growth stage (BBCH 81-89) and allow the application to continue for 4.5 days to accelerate the ripening process of the greenhouse tomato crop. For greenhouse tomatoes the B100 Restrain Generator is recommended to be used overnight, with the windows closed and switched off at approximately 4:00 am and all windows re-opened to flush out the humidity and ethylene gas.

The B100 Restrain Generator can be used in areas with an empty volume of > 200 m³. The maximum size of the greenhouse is dependent on the standard construction, air leakage, and the target level of ethylene gas. The setting for the B100 Restrain Generator (1.44 L/24 hrs., 2.88 L/24 hrs. or 4.32 L/24 hrs.) to produce the recommended level of ethylene gas will be determined by the total greenhouse volume.

Place the B100 Restrain Generator with the bottom in a location with a maximum gradient of 5 degrees with at least 60 cm (2 ft.) minimum free space surrounding it. The location in the greenhouse depends on the layout and design. A Micro Pump filter MF4-34 tube is fitted with a filter and placed into the container of Restrain Fuel. Select the recommended dosage setting using the switch on the B100 Restrain Generator and begin operation.

The machine should be checked DAILY for correct operation.

Note: Follow the instructions in the B100 Restrain Generator Operations manual for proper use, maintenance and clean-up procedures.

ENVIRONMENTAL PRECAUTIONS:

The B100 Restrain Generator is to be emptied and cleaned prior to moving or storage.

STORAGE

Store any unused Restrain Fuel in its original container in a cool, dry place. Store this product away from food and feed. Store out of reach of children, preferably in a locked storage area.

DISPOSAL

Disposal of Unused, Unwanted Product: For information on disposal of unused, unwanted product, contact the manufacturer and the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for cleanup of spills.

NOTICE TO USER:

This pest control product is to be used only in accordance with the directions on the label. It is an offense under the *Pest Control Products Act* to use this product in a way that is inconsistent with the directions on the label.



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V1.1

Original user manual

© Restrain 2019



It is mandatory to read this manual before you use the machine.

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Restrain reserves the right to change specifications and/or spare parts without prior

 $notice. \ The \ content \ of \ this \ user \ manual \ may \ also \ be \ changed \ without \ prior \ notice.$

For information about settings, maintenance and repairs not provided for in this user manual, please contact the technical department of your supplier.

This user manual has been compiled with all possible care. Restrain assumes no responsibility for any errors in this manual and/or the consequences of an erroneous interpretation of the instructions.

All rights reserved. No part of this publication may be reproduced, stored in computerised databases, or made public, in any form or by any means, either electronic, mechanical, through photocopying, recording or otherwise, without the prior written consent of Restrain. This also applies to the associated drawings and diagrams.

PREFACE

This is the manual for the B100 Restrain Generator for ripening, hereafter referred to as 'the machine'.

This manual is intended for anyone who works with the machine.

This manual contains information and instructions for installation, operation and maintenance of the machine. We recommend that you carefully read this manual before use and follow the procedures and instructions strictly. This will ensure that you get the best out of the machine and prevents possible accidents and serious injury. The application and use of this product is the user's responsibility and should be in accordance with relevant legislation.

Storing the manual

This manual is a part of your machine. Store the manual in the immediate vicinity of the machine. Always present a copy of the manual to anyone who works with the machine.

List of the symbols used in this manual

For all operations in which the safety of the operator and/or technician is at stake and where caution should be exercised, the following symbols are used.



Indicates a hazardous situation that, if not avoided, could result in serious injury or death and/or material damage if one does not obey the safety instructions.



Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury and/or material damage if one does not follow the safety instructions.



Provides additional information that is helpful to do a task or to avoid problems.

Version history

During the lifetime of the machine, engineering improvements may result in the need to revise this manual. It is then at the discretion of Restrain, if a revision or new version of this manual is required. The following table describes the main changes for each document version of this manual.

Version	Date	Changes
V1.0	August 2019	Original
V1.1	November 20219	Minor revisions

INTRODUCTION

The machine is a leased product.



- It is not allowed to make any changes to or replace any parts of the machine. Any
 modification may result in hazardous situations that can cause personal injury and damage
 the machine. Furthermore, this will void the warranty and lease contract. Contact the
 manufacturer if anything needs replacement.
- Always use Restrain Fuel supplied by the manufacturer. The machine has been thoroughly
 tested with this specific fuel. If you use any other type of fuel, this may negatively affect the
 operation and life expectancy of the machine. Furthermore, it will damage the crops, may
 damage the machine and cause personal injury.



INTENDED USE

The machine is intended for indoor use only. The maximum storage area size depends on the standard of construction, room air leakage, and the target level of ethylene concentration.



When the room is too small, too much ethylene will remain inside. This will damage the crops

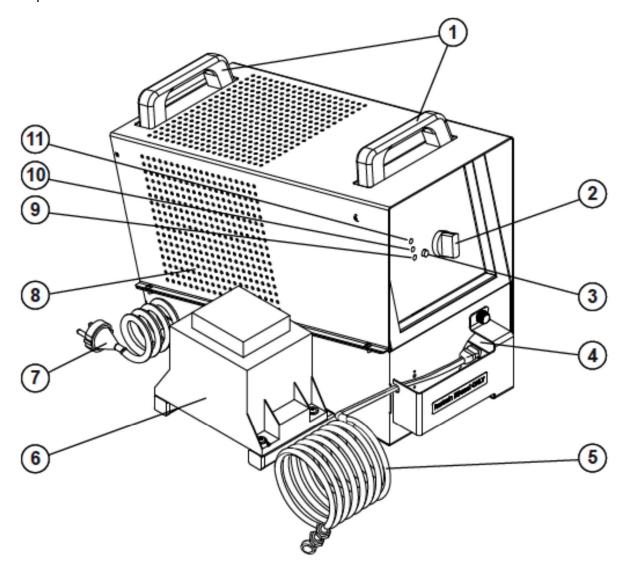
TECHNICAL SPECIFICATIONS

The following specifications apply to the machine:

Description	Value
Length	50 cm
Width	32 cm
Height	40 cm
Weight	21 kg
Sound emission	Max. 40 dB(A)
Minimum ambient temperature when in use	-1 °C
Maximum ambient temperature when in use	30 °C
Maximum relative humidity when in use	95%

DESCRIPTION

This chapter describes the B100 Restrain Generator and its functions.



No.	Item	Function
1.	Handles	Use the handles to carry the machine.
2.	Program selection knob	Use the program selection knob to select the required pump speed.
3.	Reset button	Use the reset button to restart the machine after a thermal error. Refer to <i>Troubleshooting</i> on page 20 for more information.

No.	Item	Function
4.	Ethanol pump	The ethanol pump pumps the ethanol from the jerrycan to the machine.
5.	Ethanol tube	The ethanol tube transports the ethanol from the jerrycan to the machine.
6.	Power converter	The power converter converts the voltage from the mains power supply.
7.	Mains power supply cord	Use the mains power supply cord to turn the machine on or off.
8.	Exhaust	The exhaust expels hot air from the heater.
9.	Thermal error light	The Thermal error light blinks red when the catalyst has reached its upper limit.
10.	Pump light	The Pump light turns yellow when the pump is on.
11.	Power light	The Power light turns green when the machine is powered.

WORKINGS OF THE MACHINE

The machine has an internal catalyst. The temperature of the catalyst reaches a high temperature. The Restrain Fuel is pumped into the machine, the heat of the catalyst will vapourize the fuel, which then turns into ethylene.

PROGRAMS

There are three programs you can choose for the product you want to ripen:

- A pump speed of 1.44 litres per 24 hours
- A pump speed of 2.88 litres per 24 hours
- A pump speed of 4.32 litres per 24 hours

SAFETY

PRECAUTIONS

KEEP OUT OF REACH OF CHILDREN

FLAMMABLE – Highly flammable liquid and vapour. Extremely flammable gas. Keep away from heat/sparks/open flames/hot surfaces. No smoking.

Avoid breathing gas.

May cause drowsiness or dizziness.

Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove and wash contaminated clothing before reuse.

Prior to re-entry, ventilate areas after application either by opening windows and doors or using fans, where required, to aid in the circulation of air. Air exchange/ventilation systems confirmed to be operational may also be used.

Workers must wear a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes during application, clean-up and repair of Restrain Ethylene Generator Model B100. A respirator with a NIOSH-approved organic-vapour-removing cartridge with a prefilter approved for pesticides, or a NIOSH-approved canister approved for pesticides is required if levels of ethylene oxide are above permissible levels (ACGIH TLV - TWA 1 ppm).

Follow manufacturer's instructions for cleaning/maintaining personal protective equipment (PPE). If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove Personal Protective Equipment immediately after handing this product.
- Wash the outside of gloves before removing.
- As soon as possible, wash thoroughly and change into clean clothing.

FIRST AID

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control centre or doctor for further treatment advice.

Take container, label or product name and Pest Control Product Registration Number with you when seeking medical attention.

TOXICOLOGICAL INFORMATION

Treat symptomatically.

Your machine has been carefully designed and expertly built to be operated safely. However, there are always dangers and safety risks that cannot be eliminated. These dangers and risks are the result of the use functions of the machine and operation of the machine by the user. This section discusses safety instructions and precautions, how they will be pointed out to you and the requirements the user must meet. It is essential that you are well aware of these safety instructions and requirements and observe them at all times.

Safety signs on the machine

Pictograms and warnings have been fitted on the machine to warn users of the possible risks.

Pictogram	Explanation	Location
	Warning sign "Heat"	At the rear of the machine
	Warning sign "This side up"	At the right side of the machine
Restrain Ethanol ONLY	Text sign "Restrain Fuel ONLY"	At the front of the machine



Make sure that the safety signs are always clearly recognizable and legible. Replace them if this is not the case.

Safety measures

Your machine has been equipped with the following internal safety measures:

Heating system sensors

The heating system is supplied with two internal sensors. One sensor measures the temperature of the heater, the second sensor operates as a safety device. When the two sensors measure different values or one of the sensors fails to operate, the machine will stop the vaporization cycle automatically. The **Thermal error** light will blink red. Refer to *Troubleshooting* on page 20 for more information.

General safety warnings

Always adhere to the safety warnings in this manual. Failure to do so may result in serious personal injury or material damage.



- Restrain Fuel is extremely flammable. Do not smoke or use open fire, a radio or a mobile phone when you handle the fuel.
- Do not place the machine in the vicinity of an ignition source.
- Make sure that there is a minimum of 0.6 m free space around the machine. The exhaust becomes very hot and may cause an ignition hazard.
- Make sure that cables and wires cannot come into contact with the exhaust. The exhaust becomes very hot and may cause an ignition hazard.
- Children must not play with the machine or the fuel and the machine, the mains power supply cord and the ethanol must be out of reach of children less than 16 years old. Restrain Fuel is extremely flammable and an irritant.
- Persons with reduced physical, sensory or mental capabilities or lack of knowledge must not to use the machine. Restrain Fuel is extremely flammable and an irritant.
- Immediately disconnect the machine from the power supply in case of damage to or broken parts of the mains power supply cord or power converter. Damaged or broken parts of the electrical system may cause serious personal injury.
- Do not remove the covers at any time. This may cause serious personal injury or material damage.



- Restrain Fuel is an irritant, wear gloves and safety goggles when handling.
- Make sure that the location in which the machine is placed, has a minimum volume of 200 m³. Too much ethylene in the room will damage the crops.
- Make sure that the machine is kept free from moisture. Water ingress in the machine may cause material damage.
- The machine contains a heater that becomes very hot. When you turn off the machine, wait a minimum of 6 hours before you handle or move the machine.

TRANSPORT



- The machine weighs 21 kg. Always carry the machine with two hands and keep the machine upright.
- Do not drop the machine. This may cause personal injury or material damage.
- The machine has a cool down period of 6 hours. Turn off the machine hours before shipment.

INSTALLATION

This chapter describes the correct unpacking and installation procedures.

Unpacking

You receive the machine in special packaging.



Keep the packaging intact and store the packaging in a dry location. You need this packaging when you return the machine to the manufacturer.

- 1. Carefully open the packaging.
- 2. Remove all materials from the box.
- 3. Make sure that all ordered parts have been delivered:
 - B100 Restrain Generator

Place the machine

This task describes where and how to place the machine.

- 1. Place the machine in the premises that needs treatment.
- 2. Make sure that the location meets the following requirements:
 - · Place the machine at floor level.
 - Place the machine at a location with good air circulation.
 - Place the machine in a location away from normal loading activities.



Make sure that the machine does not touch any foreign objects or plastic structures. The vapour from the machine is hot and can damage other surfaces.

- 3. Place barriers around the machine to protect the machine from potential damage.
- **4.** Place a small amount of absorbent material under the exhaust to collect possible condensation.
- **5.** Plug the mains power supply cord into the electrical socket.

Prepare the Restrain Fuel jerrycan

This task explains how to prepare the Restrain Fuel jerrycan for use with the machine.

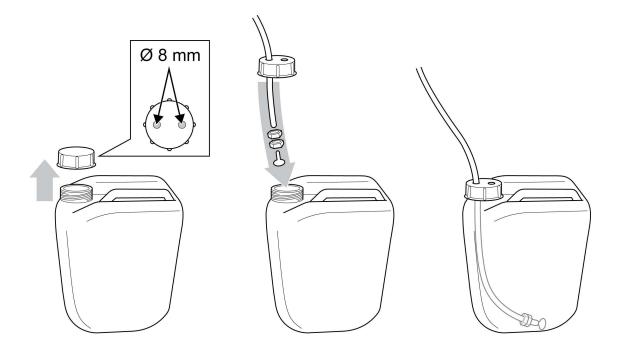


Restrain Fuel is extremely flammable. Do not smoke or use open fire, a radio or a mobile phone when you handle the fuel.



Tools needed:

- Electric drill
- 8 mm drill bit



- 1. Remove the cable ties from the tube.
- 2. Remove the filter and weights from the tube.
- 3. Remove the cap from the Restrain Fuel jerrycan.
- **4.** Drill two holes in the cap: one for the ethanol tube, one for the air.
- **5.** Guide the ethanol tube through one of the holes.
- **6.** Replace the weights and filter on the tube.
- **7.** Screw the cap back onto the Restrain Fuel jerrycan. Make sure that the filter touches the bottom of the jerrycan.

OPERATION

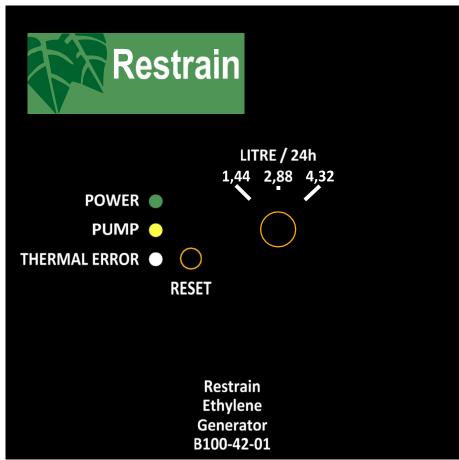
This chapter explains how to operate the machine.

Start the machine

If necessary, start the machine as follows:

- Plug in the mains power supply cord into the electrical socket.
 The Power light will turn green.
 The heater is warming the catalyst. This takes approximately 40 minutes.
- **2.** Select the required programme:
 - Pump speed 1.44 litres per 24 hours
 - Pump speed 2.88 litres per 24 hours
 - Pump speed 4.32 litres per 24 hours

The **Pump** light turns yellow.



Turn off the machine

This task describes how to turn off the machine.

1. Disconnect the machine from the mains power supply.



The machine remains hot for at least 6 hours. Wait until the machine has cooled down sufficiently before you handle or transport the machine.

Emergency situations

In case of an emergency situation:

1. Unplug the machine from the mains power supply.

For any other problem, refer to Troubleshooting on page 20. To

restart the machine after an emergency situation:

Plug in the mains power supply cord.
 The machine will continue with its program.

MAINTENANCE AND CLEANING

The machine does not require maintenance from the user.



Never open the machine yourself, this will damage the machine. If the machine requires service or maintenance, contact the manufacturer.

Daily checks

When the machine is in use, make sure that the machine works correctly:

- The Power light is green.
- The **Pump** light is yellow.
- · The Thermal error light is off.
- · All cables are connected and undamaged.

Monthly check

When the machine is in use, make sure that all covers are properly secured.

Cleaning

Regularly clean the machine with a clean, soft and moist cloth.



Do not spray the machine with water or immerse the machine in water. This will permanently damage the machine.

STORAGE

Store any unused Restrain Fuel in its original container in a cool, dry place. Store this product away from food and feed. Store out of reach of children, preferably in a locked storage area.

You can store the machine for later use.

- Always store the machine indoors. Keep the machine dry and free from weather influences.
- Make sure that the machine is placed upright when in storage.
- · Store the machine in its original packaging.

Prepare for storage

This task describes how to prepare the machine for storage.

- **1.** Disconnect the machine from the mains power supply.
- 2. Let the machine cool down for 6 hours.
- **3.** Remove the tube from the Restrain Fuel jerrycan.
- **4.** Store or dispose of the Restrain Fuel according to local laws and regulations.

TROUBLESHOOTING

This chapter describes the possible problems you may have with your machine and how to solve them. Contact the manufacturer if you need assistance or if any other problem arises.

Problems with the machine

Problem	Possible cause	Solution
The machine does not start.	The power supply cord is damaged or not plugged in.	Make sure that the power supply cord is undamaged and plugged in the electrical socket.
	There is no mains power supply.	Wait until the mains power supply comes back or connect the machine to a different power supply (e.g. a generator). The machine will continue with the selected program.
The Thermal error light blinks red and the heater has turned off.	The temperature inside the catalyst reached the upper limit.	Wait 1 hour, then push the Reset button. After approximately 40 minutes the catalyst is warmed up and the machine will continue with the selected program.

END OF THE LEASE CONTRACT

At the end of the lease contract, you have to return the machine to the manufacturer. Follow the steps below to pack the machine.

- 1. Disconnect the machine from the mains power supply.
- 2. Let the machine cool down for 6 hours.
- 3. Remove the tube from the Restrain Fuel jerrycan.
- **4.** Store or dispose of the Restrain Fuel according to local laws and regulations.



Do not return Restrain Fuel to the manufacturer. Restrain Fuel is highly explosive and can only be shipped under specific conditions.

- 5. Pack the machine in its original packaging.
- **6.** Contact the manufacturer for the return shipment of the machine.

DISPOSAL

Never dispose of the machine yourself. Always return the machine to the manufacturer.

Disposal of Unused, Unwanted Product: For information on disposal of unused, unwanted product, contact the manufacturer and the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for cleanup of spills.

NOTICE TO USER:

This pest control product is to be used only in accordance with the directions on the label. It is an offense under the *Pest Control Products Act* to use this product in a way that is inconsistent with the directions on the label.

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