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# INSTALLATION AND OPERATING INSTRUCTION MANUAL



## ZANTINGH CO<sub>2</sub> DOSING SYSTEM



ABN AMRO 49.42.46.294  
BIC ABNANL2A  
IBAN NL17ABNA0494246294  
KvK. A'dam 34041535  
BTW nr. NL0015.13.138.B.01



## **IMPORTANT Read this first!**

This manual is an integral part of the product, it includes instructions for installation, commissioning and operation.

Read instructions attentively! Manufacturers responsibility and warranty shall not apply if installation, commissioning, operation or maintenance is not in accordance to the regulations of this manual.

Store this manual carefully!

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## 1. INTRODUCTION

Dear Customer,

We would like to thank you for your confidence in our organisation and product.

We provide this manual to ensure distribution of all important information for your safety, optimal profit and product life-time.

We recommend you read this manual and instructions carefully before installing the CO<sub>2</sub> dosing system.

In order to meet these objectives, installation, commissioning, operation and maintenance shall be carried-out in accordance to the instructions of this manual and local regulations. The safety and operating instructions must be followed.

Additional information and support can be provided by our technical department.

If you have any questions, please contact us.

Phone +31297219100 or [info@zantingh.com](mailto:info@zantingh.com)

## 2. GENERAL

The Zantingh CO<sub>2</sub> dosing systems are used for central CO<sub>2</sub> dosage in greenhouses. The flue gas produced by natural gas fired pressure heating and steam boiler systems and/or heating/power generators are transported to the greenhouse area by a transport dosing system. The flue gas is distributed within the greenhouse area using PVC pipes and CO<sub>2</sub> tubing (hoses).

The Zantingh CO<sub>2</sub> dosing systems are suitable for transporting flue gas from gas fired pressure heating and boiler systems and/or heating/power generators with a maximum temperature of 60°C. The Zantingh CO<sub>2</sub> dosing system consists of a stainless steel system with a directly linked stainless impeller, a three-phase motor and a stainless steel diverter valve. The complete construction has, therefore, the best possible resistance to aggressive condensation and flue gas. The diverter valve has two openings for flue gas supply and mixed air and has been provided with an open/close servomotor. The system is obviously also provided with all the required temperature and pressure protections and a flexible connection sleeve at the inlet and the outlet side.

The CO<sub>2</sub> dosing system with valve is built on a sturdy support frame and can be mounted on the floor or at a specific height, for example on a Zantingh flue gas condenser. A mounting set with support legs can be included in the delivery when the CO<sub>2</sub> dosing system is ordered in combination with a Zantingh flue gas condenser. The switch panel for the control of the CO<sub>2</sub> dosing system is optional and is supplied separately. In general, however, the switches for the CO<sub>2</sub> dosing system are built-in into the burner system switch panel. The required electrical circuit diagrams are also provided. The switch panel has all control and protection equipment and is supplied based on the Dutch VISA regulations. When the motor has a capacity bigger than 3.0 kW, the panel is provided with a star/delta connection. The delivery side of the CO<sub>2</sub> dosing system can be supplied in various positions. This means that the units can be used under most circumstances.

### 3. REGULATIONS



#### IMPORTANT:

The dosing system should be installed by a recognized (heating) installer. The instructions meet the applicable (local) standards and regulations. The electrical connections meet the requirements of standard NEN 1010. The condensation drain and flue gas connections must comply with standard NEN 3028. The local regulations should also be taken into account.

### 4. DELIVERY PARTS

The standard version of the CO<sub>2</sub> dosing system has been designed to be used under the following operating conditions:

- Maximum flue gas temperature: 60°C, for intake of the dosing system.

Prior to delivery, the CO<sub>2</sub> dosing system is checked for imbalance of the cooling fan. A balance certificate is available on request.

The CO<sub>2</sub> dosing system is available in 4 outlet positions (refer to Figure 1).

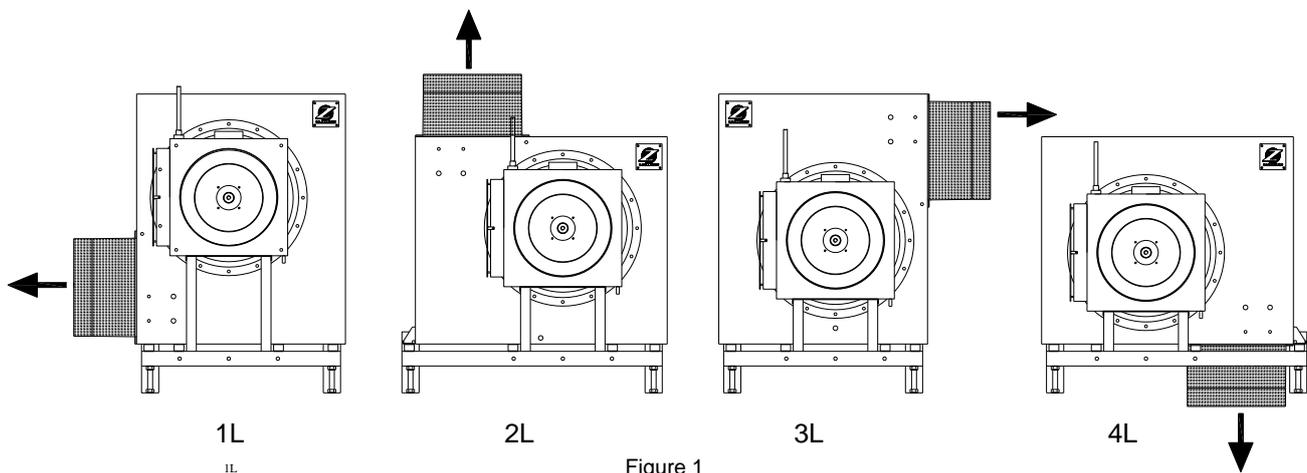


Figure 1

The CO<sub>2</sub> dosing system consists of the following accessories and supplied assembly parts. Check whether all parts are included in the delivery before starting the assembly.

#### Standard Delivery:

- A dosing system, provided with a three-phase motor with directly linked impeller, built on a sturdy support frame.
- A specially constructed, independent diverter valve (inlet combination valve) built on the support frame and provided with an open/close servomotor with a limit switch.
- A pressure switch for monitoring the flow.
- A maximum thermostat for maximum temperature protection.
- A flexible sleeve to be connected to the pipe system at the suction and delivery side of the dosing system.

The components have been assembled at the factory when possible.

## Other Options:

- Modulation thermostat.
- Frequency regulator with pressure sensor.
- Switch panel, optional with switching for pure CO<sub>2</sub> dosing
- CO detector with CO sensor.

## 5.1 ACCESSORIES

### 5.1.1 CO<sub>2</sub> Dosing System

The CO<sub>2</sub> dosing system takes flue gas from the chimney of the CO<sub>2</sub> source and blows it into the CO<sub>2</sub> pipe system to the greenhouses. The flue gas should not be released into the same area as that from which the combustion air for the CO<sub>2</sub> source is taken.

### 5.1.2 Diverter Valve

The diverter valve is mounted between the CO<sub>2</sub> dosing system and the flue gas. This is a three-way valve with the following connections:

- Connection to the flue gas / chimney.
- Connection to the CO<sub>2</sub> dosing system.
- Open connection to the surroundings and/or open air.

The open connection is required to mix the flue gas with "cold" air if the flue gas intake temperature is too high.

In closed position, the diverter valve closes off the flue gas supply.

The valve is controlled by means of an open/close servomotor.

The diverter valve has a limit switch to control the valve position.

### 5.1.3 Pressure Switch

The outlet of the CO<sub>2</sub> dosing system has a pressure switch.

This pressure switch becomes active when the CO<sub>2</sub> dosing system reaches the set pressure. Only when the pressure switch is active should the flue gas supply be opened by the diverter valve.

### 5.1.4 Maximum Thermostat

The CO<sub>2</sub> dosing system has a maximum thermostat to control the maximum temperature of the flue gas to be transported. If the temperature of the flue gas reaches 60°C, the thermostat is triggered. The temperature of the flue gas should not be higher than 60 °C because of the PVC pipes of the CO<sub>2</sub> pipe system. Higher temperatures could cause several damages to the pipe system and the greenhouse plants.

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## 5.2 OPTIONAL ACCESSORIES

### 5.2.1 Temperature Regulator

If the temperature of the flue gas is higher than 60°C, usually if no condenser is used, the flue gas can be mixed with "cold" air by means of the diverter valve. The CO<sub>2</sub> dosing system can be provided with a three-point regulator that controls the diverter valve by checking the temperature and drawing in "cold" air. The default setting is 55°C.

### 5.2.2 CO Detectors

The flue gas can contain harmful substances, such as carbon monoxide (CO), which could damage the plants. A CO detector can be mounted to measure the amount of CO in the flue gas. Zantingh can supply various types of CO detectors. Please contact our Sales department for more information.

### 5.2.3 Switch Panel

A CO<sub>2</sub> switch panel for the control of the CO<sub>2</sub> dosing system can be provided. The CO<sub>2</sub> switch can also be built into the burner panel if it is ordered in combination with a new Zantingh burner.

The CO<sub>2</sub> dosing system can be controlled by various means, for example, a frequency switch, soft starters, star/delta connections and combined switches with pure CO<sub>2</sub>, various CO<sub>2</sub> sources and/or flue gas valves. Please contact our Sales department for more information.

## 6. ASSEMBLY

### 6.1 General



#### **IMPORTANT:**

Please check whether there are no loose objects and/or pets or other animals in the CO<sub>2</sub> dosing system or diverter valve before installing the CO<sub>2</sub> dosing system.

The CO<sub>2</sub> dosing system should be easily accessible for inspection and maintenance work. The minimum clearance around the complete device should be 0.5 metres.



#### **Minimum Tool Requirement:**

Lifting/hoisting equipment  
Drill  
Screwdriver  
Measuring tape  
Level indicator  
Aluminium tape  
Safety glasses  
Gloves  
Wrenches

### 6.2 Transport and Assembly



For installation and transport, unit shall only be lifted by means of a forklift as shown, or hoisting belts, placed at same spot as forklift (Refer to Figure 2.)

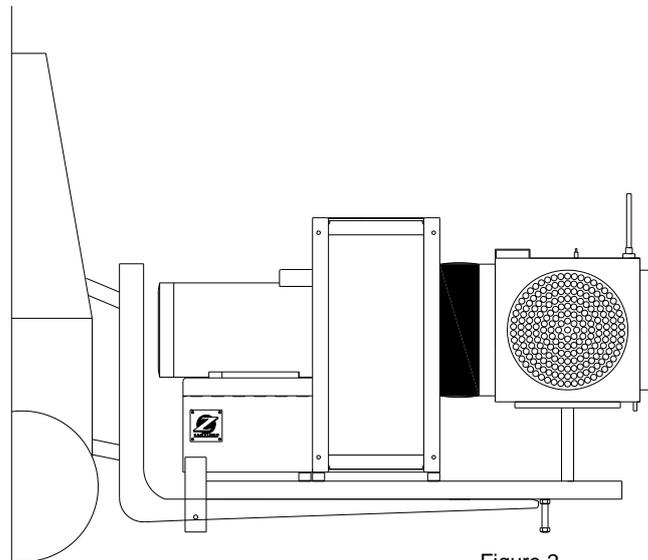


Figure 2

### 6.3 Assembly



#### **ATTENTION:**

Read the assembly and operating instructions carefully prior to assembly. Ensure there is sufficient clearance around the flue gas condenser and CO<sub>2</sub> dosing system and that the workplace is clean. Use only approved and certified lifting/hoisting equipment and electric tools.

The CO<sub>2</sub> dosing system should be installed as close as possible to the flue gas chimney. When the CO<sub>2</sub> dosing system is mounted on a Zantingh Total Condensor, a mounting frame may be used to directly link the CO<sub>2</sub> dosing system to the condenser. In that case no pipe system is required between the CO<sub>2</sub> connection on the chimney and the inlet of the diverter valve. Use the supplied sleeve to make this connection.

### 6.4 Mechanical

The assembled CO<sub>2</sub> dosing system should be free of vibration and tension. Connect the diverter valve to the chimney using the supplied sleeve.



#### **ATTENTION:**

The parts of a flue gas connection may be hot!

Connect the delivery side (outside) of the CO<sub>2</sub> dosing system to the pipe system using the supplied sleeve. The condensate drain of the diverter valve and the CO<sub>2</sub> dosing fan should be connected to a siphon which is connected to the sewer system.

#### **IMPORTANT:**

Use the supplied sleeves for the assembly of the CO<sub>2</sub> dosing system.



### 6.5 Power Supply

The CO<sub>2</sub> dosing system should be connected according to the applicable local standards and regulations. Depending on the model, the CO<sub>2</sub> dosing system should be wired according to the electrical diagram in the switch panel.

## 7. PUTTING INTO OPERATION

The model of the CO<sub>2</sub> dosing system determines how it should be put into operation depends.

Please ensure all pipes and wires have been correctly connected before putting the CO<sub>2</sub> dosing system into operation.



### IMPORTANT:

Switching the main switch on the CO<sub>2</sub> panel off also switches the burner off. The reset button should be pressed to cancel the error after an error occurs.

The following procedure is only applicable for a switch panel supplied by Zantingh.

#### Switch the main switch off.

Check whether the horticulture computer sends the signal for CO<sub>2</sub> supply before you start. If it is not, a connection should be made on the panel between terminals 163 and 164.

#### Switch the main switch on.

When the CO<sub>2</sub> source (burner) sends the signal for CO<sub>2</sub> release to the CO<sub>2</sub> switch panel, the selector switch on the panel should be set to dosage. When everything works properly, the CO<sub>2</sub> dosing system will run and the diverter valve will rotate to open the suction to the flue gas / chimney.

Measure the electrical current to the electric motor during CO<sub>2</sub> dosing system operation. This value is used as the setting for the thermal protection. Check the thermal protection by lowering the setting to a value below the measured current. A “Fan load” error should occur. Check whether the diverter valve closes. Next, reset the setting for the thermal protection to the correct value. Compare the set value with the data on the motor type plate. The setting may be set at a value that is not more than 5% higher than the value on the type plate.

Reset the thermal protection and put the CO<sub>2</sub> dosing system into operation again.

Check the pressure at the pressure switch on the outlet of the dosing system. Set the pressure switch to a value 10% lower than the measured pressure.

Increase the setting for the pressure switch until a “CO<sub>2</sub> transport” error occurs to test whether the pressure switch is working correctly. Check whether the CO<sub>2</sub> dosing system is switched off and the diverter valve is closed. Next, set the pressure switch to the correct value. Reset the error. Put the CO<sub>2</sub> dosing system in operation and lower the maximum setting for the thermostat until the “Maximum temperature” error occurs.

Next, set the thermostat to the desired value. However, if PVC pipes are used, as is often the case, the thermostat should be set to a maximum of 60°C. Check whether the CO<sub>2</sub> dosing system is switched off and the diverter valve is closed.

Set the selector switch on the panel to the OFF position. Manually open the diverter valve to the flue. The “Closed position” error should now occur. This may take some time due to time-delay contacts. When this error occurs, the burner system **must** also be switched off.

## 8. TROUBLESHOOTING



### IMPORTANT:

Switch the main switch on the CO<sub>2</sub> panel off before undertaking any service activities. Ensure it cannot be switched on during the work. Never perform any work if there is tension on the system.

Switching the main switch on the CO<sub>2</sub> panel off also switches the burner off.

Error	Possible Cause	Possible Solution
Burner error*	Main switch on CO <sub>2</sub> panel is switched off.	Switch it on.
	Diverter valve is not closed.	Close the valve.
Transport error*	The descending pipe is broken.	Repair the pipe.
	Transition timer setting is too low.	Increase the value of the setting.
	CO <sub>2</sub> dosing fan rotates in the wrong direction.	Check the direction of rotation and adjust it.
	Pressure switch is set incorrectly.	Measure the pressure and reset the setting for the pressure switch.
	Pressure switch is defective.	Replace it.
Max. temp*(Maximum temperature)	Condensor cooling is insufficient.	Check the condenser for pollution at the water and/or flue gas side.
	The amount of air that is mixed is not enough.	Set the diverter valve to mix in more air.
	Thermostat is defective.	Replace it.
	Thermostat setting is too low.	Increase the setting. The value should be < 60°C.
Thermal disconnection*	No tension/voltage (three-phase).	Check the fuses.
	Thermal protection is defective.	Replace it.
	Motor bearings are defective.	Replace the bearings.
	Fan is polluted or imbalanced.	Clean it.
Closed position*	Servomotor is defective.	Replace it.
	Limit switch is defective.	Replace it.
	Transition timer setting is too low.	Increase the value of the setting.
CO error*	Burner burning has changed.	The burner should be checked.
	CO sensor is not working properly.	Calibrate the sensor.

\* Error is probably visually indicated by an LED on the switch panel of the burner system or the CO<sub>2</sub> panel.



### IMPORTANT:

The reset button should be pressed to cancel the error after an error occurs. The reset button for the dosing system is located on the switch panel. The reset button for the CO system is located on the CO panel and/or the CO detector.

## 9. MAINTENANCE INSTRUCTIONS



### IMPORTANT:

Check the following before the start of a new cultivation season:

Check the operation of the CO<sub>2</sub> dosing system and the diverter valve.

Calibrate the CO<sub>2</sub> gauge using calibration gas.

Calibrate the CO detector using calibration gas (**calibrate at least once a year**). The life span of the CO cell is approximately 2 years.

Check the pipe system and the CO<sub>2</sub> tubing.

Check the various protections for the device.

### 9.1 Remarks:

Always consult the installer or Zantingh if you have any doubts regarding the operation and use of the system.

The CO<sub>2</sub> dosing system is supplied according to the applicable (safety) standards and regulations. However, it is the responsibility of the user to continually warrant the safety by making sure that the complete system is installed, commissioning and maintained according to the provisions of this manual.

Maintenance work should be carried at least once a year to ensure that the CO<sub>2</sub> dosing system is functioning correctly and safely. These inspections and maintenance work should be carried out by qualified technicians.

Never work on a system when you do not have the required skills.

Please contact the installer or Zantingh when an error occurs that cannot be resolved.

## 10. WARRANTY CONDITIONS

Zantingh B.V. guarantees this Zantingh product for the installer under the following conditions. The installer guarantees this product to the user under the same conditions provided below.

1. The period of guarantee is valid as from the day of delivery on location.  
The guarantee has a fixed period of 12 months, based on the agreed sales price.
2. The device should be installed by a recognized installer according to the applicable general and local standards and regulations and the assembly and operation instructions provided by Zantingh.
3. The system may not be moved from the original location.
4. The guarantee becomes null and void if and when:
  - Defects of the system are not reported in writing to the installer and/or Zantingh B.V. immediately after having been discovered or these could have been discovered.
  - Defects are caused by errors, improper use or neglect by the user and/or installer who has given the order or his/her legal successor or caused by external causes.
  - During the period of guarantee a third party is requested to or make provisions to the system or when the user has done so without prior written consent by the installer and/or Zantingh B.V..
  - During the period of guarantee no expert inspections and/or maintenance work are periodically performed to equipment requiring the same.
  - Corrosion has been caused by polluted flue gas, to be determined by Zantingh B.V.
  - If after research is carried out, one or more of the above conditions have not been taken into account and are the reason for any guarantee claim, the costs for the required research by Zantingh B.V. or third parties will be charged to the user.
5. The initial request based on the guarantee obligations described in this article should be submitted in writing to the installer within five working days after the error or defect has been observed or could reasonably have been observed.
6. The stipulations included in our general guarantee, sales and payment conditions, issued by the ORGALIME S 2000 “General conditions for the supply of mechanical, electrical and electronic products” are also applicable. Zantingh B.V. will not be liable for any consequential damage to the Zantingh system other than a defect covered by the guarantee as described above. Moreover, Zantingh B.V. will not be liable for any damage to income and/or loss of profit to the user of any nature what so ever.
7. Any costs incurred by assembly or disassembly, travelling or accommodation expenses, constructional costs and such required to execute the terms of the guarantee are excluded.

Any dispute between Zantingh B.V. and the buyer regarding a claim based on the guarantee, will be resolved by an expert and independent authority if so desired. The parties agree to abide by the binding decision of said authority.

## Imprint

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