User manual
Ozone generator and controller for Greywater reuse
Model: EON10AG

Rev. 1.0

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1.- Introduction

This Equipment has been designed for industrial usage.

Read completely this document, prior using this equipment, since Ozone is a gas that can damage permanently the health if breath constantly. Therefore, must be kept on an open area, and the use of an ambient ozone sensor is recommended.

2.- Technical Specifications

Electrical

Operating voltage	:	220 [VAC]
Consumption	:	2.100 [W], Máx. (Including the pumps)
Protections	:	Circuit breakers of 2A and 6A
Emergency stop	:	Yes
Recirculating pump	:	400W max.
Output pump	:	800W max.

Pneumatics

Flow rate	:	10 lpm
Feeding with atmospheric air	:	Yes
Ozone	:	10 g/h nominals. With atmospheric air the effective ozone generation is of the order of 2 g/h.

Security

The equipment stops in the Following cases	:	► Cabinet door opening ► Ozone tube overheating ► Emergency Stop button ► Low level of water in the tank

Others

Dimensions	:	600 x 400 x 250 [mm]
Peso	:	15 [Kg.]
Ambient temperature	:	30 °C maximum
Ambient Humidity	:	60% maximum (non-condensation)
Maximum Greywater to treat	:	1.500 liters per day

This equipment must not be installed outdoors and must be protected from direct sun, rain, and dust.

3.- Equipment

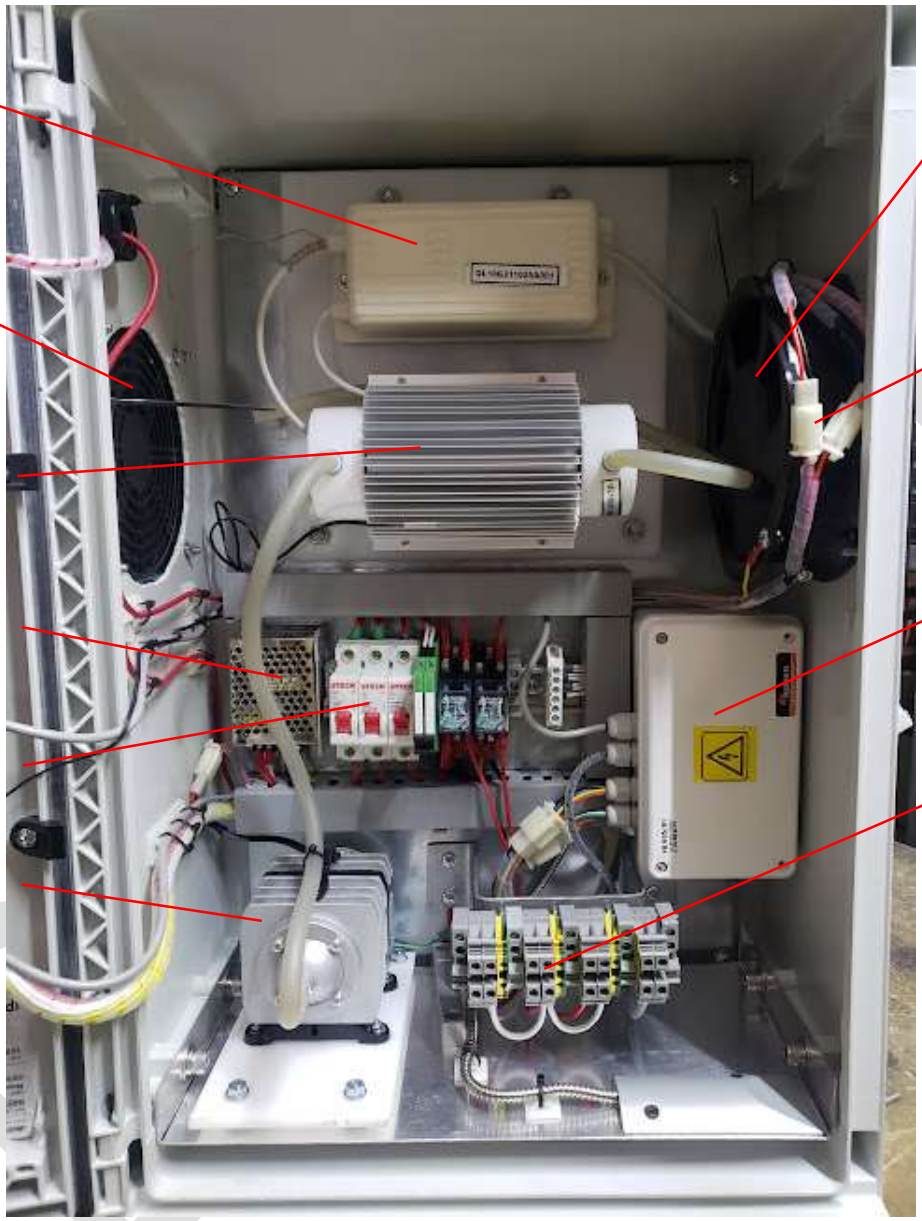
3.1- Outside

Picture N° 1, shows the external controls of the Ozone Generator (Controller):

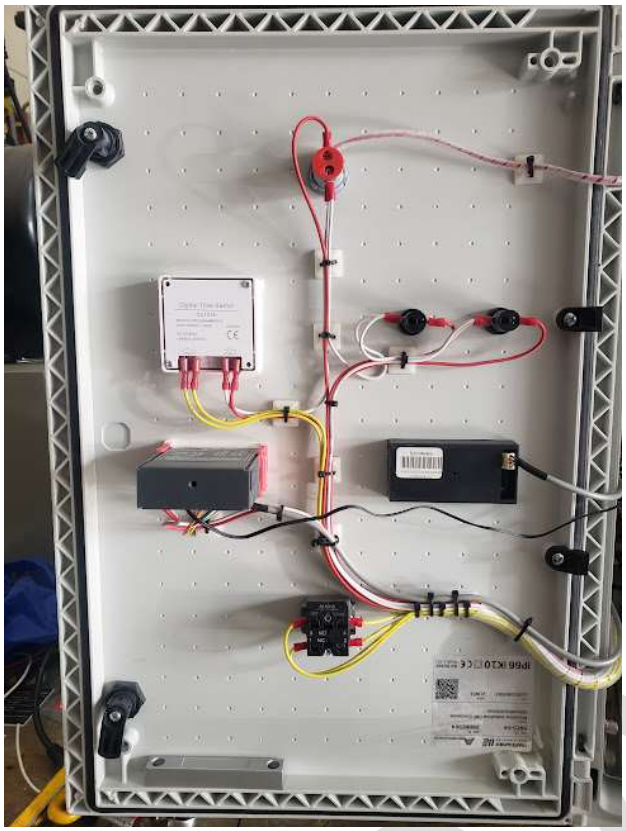
Picture N° 1

3.2.- Interior

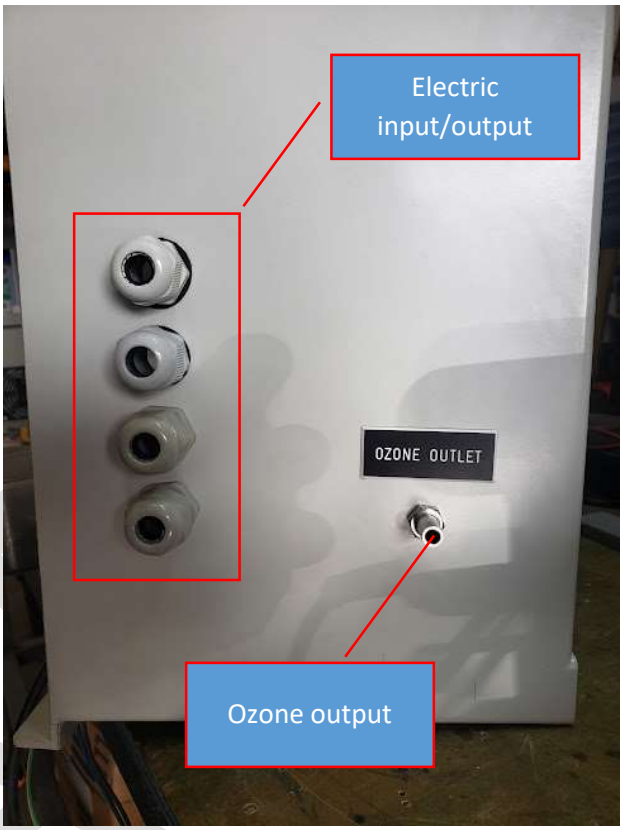
The following picture, shows the internal components of the Ozone Generator:



Picture N° 2



Picture N° 3 : door backside



Picture N° 4

4.- Installation

The Equipment must be mounted to a wall or metallic structure, that can withstand the weight of the Equipment. The mounting elements must be used for attaching the generator to the wall. A maximum distance of 3 meters from the treatment tank must be provided.

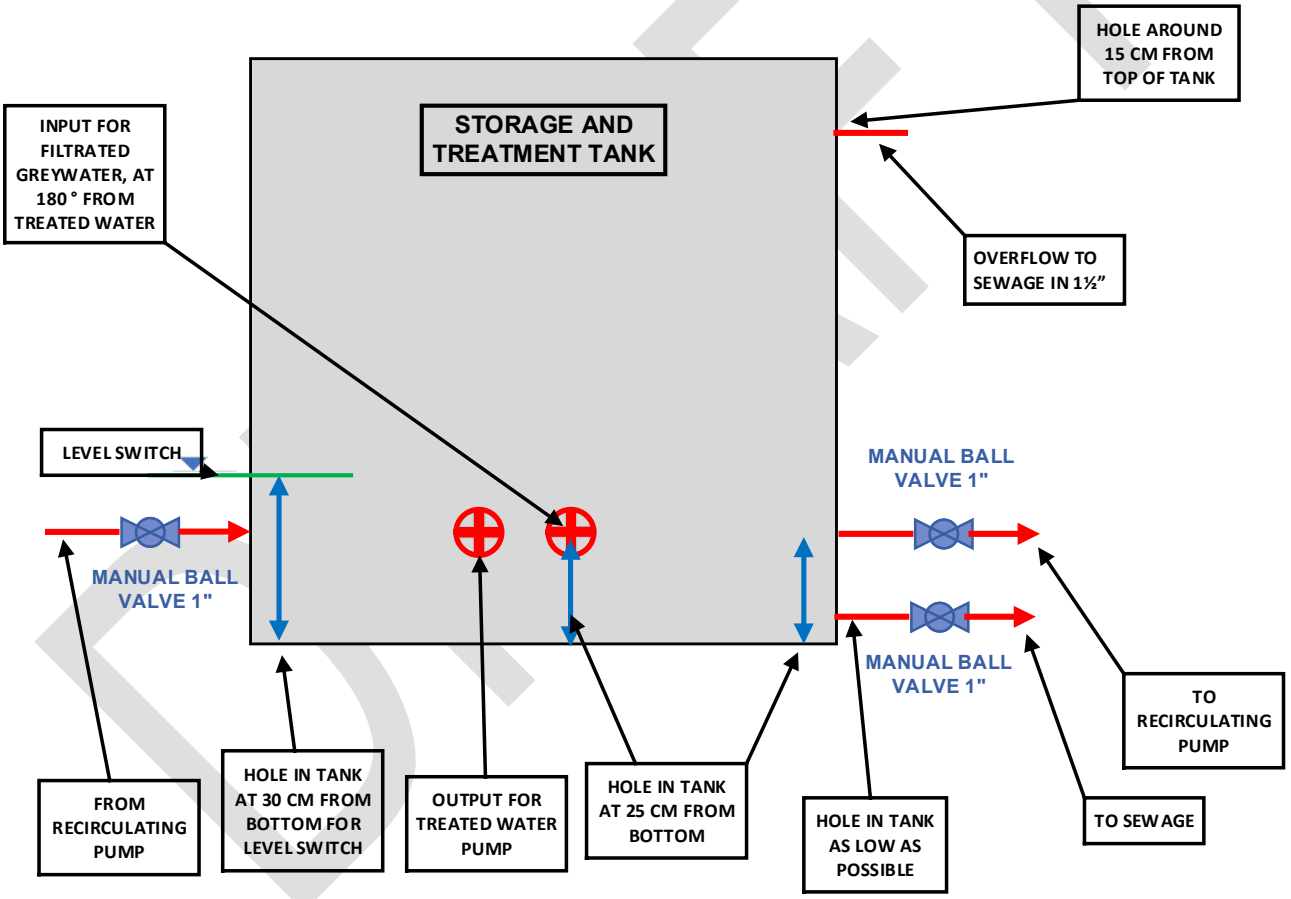
4.1.- Tank connections

This Ozone Generator has the capacity of controlling the ozone treatment of the filtered greywater in the tank, as well as the recirculation and output pump. The output pump will drive the treated water to the irrigation network, hose, or other stages for further treatment.

Tank connections:

- Filtered Greywater inlet
- Treated Greywater output
- Greywater output for ozonation
- Ozone treated greywater return to the tank
- Maintenance/cleaning output
- Overflow output
- Non diluted ozone release to the atmosphere

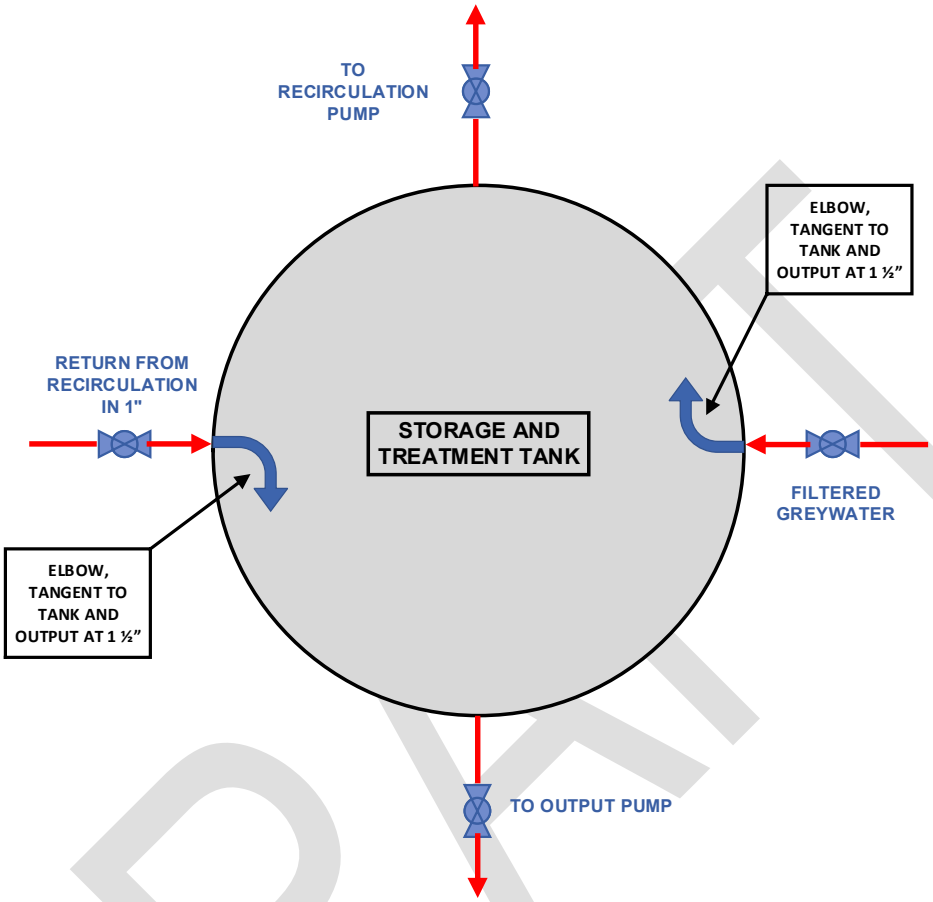
The picture of next page, shows the connections required to make at the storage and treatment tank:



Picture N° 5

The figure above shows the connections to be done to the storage and treatment tank. It is important to consider that the maximum treatment capacity of the system (1.500 liters per day), that conditions the tank size.

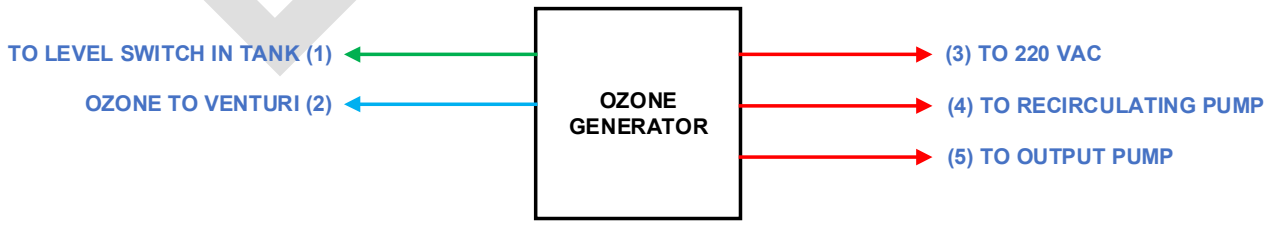
On the following picture the connections of the tank seen from the top and the inside are shown.



Picture N° 6

4.2.- System connections

The following diagram shows the connections of the Ozone Generator (Controller), and the rest of the elements of the system:



Picture N° 7

The Level Switch, recirculating pump and output pump are not supplied with the equipment. Anyhow, we recommend using the following pumps for building the system:

- ✓ Float switch like the picture besides

Picture N° 8

- ✓ ½ hp Pedrollo pump PK60 for recirculation

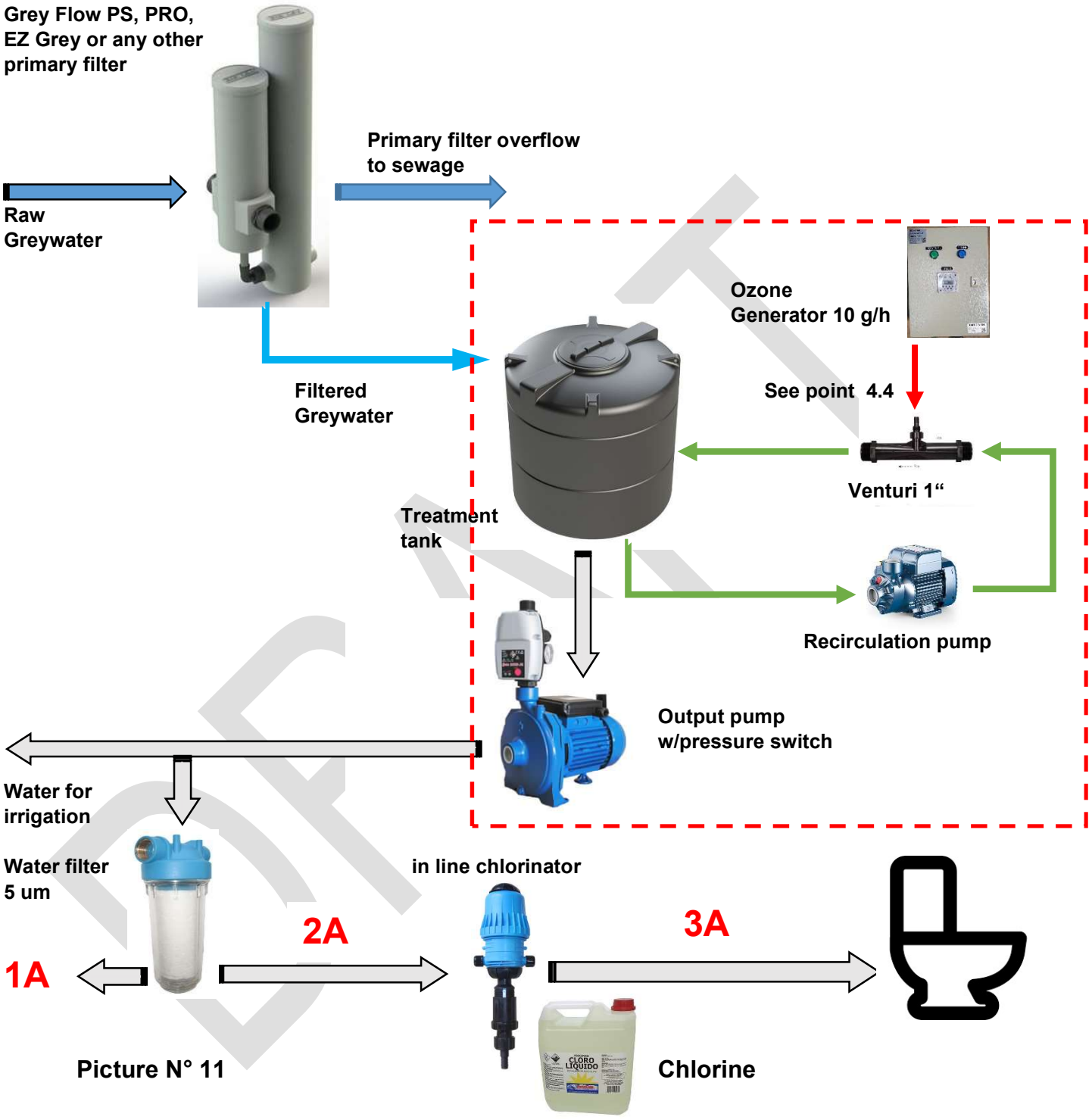
Picture N° 9

- ✓ 1 hp pump for feeding the irrigation network
  A pressure switch has also be provided

Picture N° 10

Picture N° 11, shows a diagram of a generic system with all its connections in place and all the possible options available.

The diagram shows a complete Greywater reuse system. Anyhow, the part shown inside the red rectangle with dashed lines, shows the elements that are covered in this document.

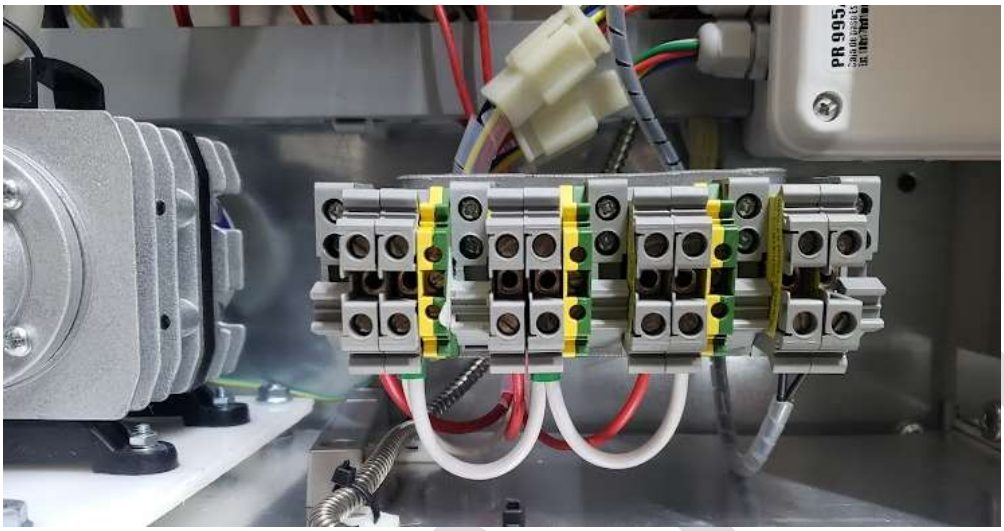


Picture N° 11

1A / 2A : Treated Greywater, achieving **Note 3** parameters
3A : Treated Greywater, achieving **Note 3** parameters, plus Chlorine, for WC Tank filling

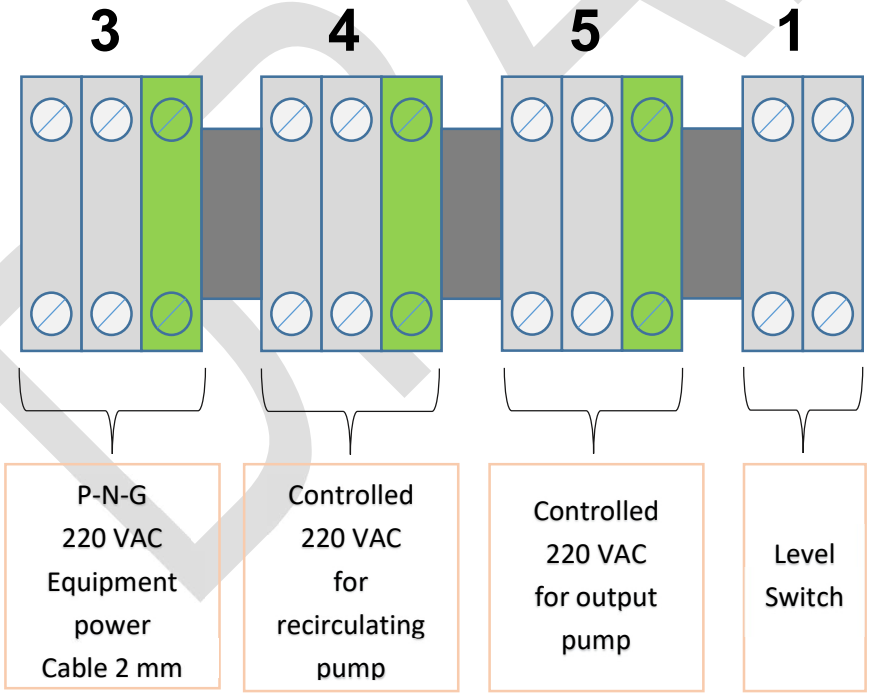
4.2.1.- Connecting the system – electrical

Picture N° 12, shows the terminals to which the electrical lines (1, 3, 4 and 5), of picture 7 are shown



Picture N° 12

The following are the position of the connections.



Picture N° 13

For powering the pumps, we recommend using a minimum of 1.5 mm cable diameter. Also, when making the electrical connections, all protections (Circuit breakers – Picture 2), of the equipment must be in its OFF position. Also, always use terminal crimps for the cables, so a more secure installation can be achieved.

After wiring all the cables to the Cabinet, all the cable glands must be tightened (Picture 4).

4.2.2.- Connecting the system – ozone

The ozone output must be connected to the 1" ozone resistant Venturi. The connection must be done with a Teflon tube of 8 mm diameter. Is also extremely important to consider the following for the ozone convection:

- Ensure the Ozone Generator is above the Venturi element (one meter it's OK).
- Use a check valve (one way valve), installed close to the Venturi, to prevent water to enter the ozone tube.

4.2.3.- Timer Programming

In the picture below Timer button functions are shown.

Picture N° 14

P : Programing button

D+ : Add day

H+ : Add hour

M+ : Add minute

: Clock / current time

C : Reset

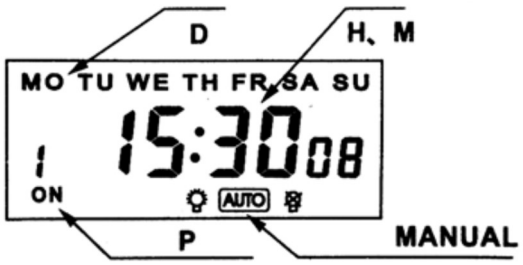
Manual : manual operation

C/R : Cancel / retrieve

Operation

To alternate between automatic and manual mode, button P has to be pressed. Every time you press this button, on the lower side of Timer's display, an indicator Will move from ON, OFF and AUTO.

- When ON, the recirculation pump and ozone generator, will be ON permanently.
- When OFF the recirculation pump and ozone generator, will be OFF permanently.
- When AUTO, the recirculation pump and ozone generator, will follow the timer programing.



Picture N° 13

AUTO Mode: normal mode of operation of the system

Prior leaving the Timer in AUTO mode, you need to verify the timer's programming is in place and match with Customer greywater generation. In order to view the programing f the Timer, you need to navigate through the programming by pressing the button P.

Every time you press button P, it will move thought the on time and off time of every memory. The Timer has 17 memories for each day.

The following is the proposed timer program, considering a family that leaves the hose prior 09:00 and returns home at 18:00.

	ON	OFF
Memory 1	09:00	10:00
Memory 2	10:30	11:00
Memory 3	11:30	12:00
Memory 4	12:30	13:00
Memory 5	13:30	14:00
Memory 6	14:30	15:00
Memory 7	15:30	16:00
Memory 8	16:30	17:00
Memory 9	17:30	18:00
Memory 10	18:30	19:00
Memory 11	19:30	20:00
Memory 12	20:30	21:00
Memory 13	22:00	22:30
Memory 14	00:00	00:30
Memory 15	02:00	02:30
Memory 16	04:00	04:30
Memory 17	07:00	07:30

In general, the Timer comes preprogrammed from factory, but it has to be verified by the user. In case is not programed, the above table shall be entered.

The programming of the Timer is done with button P. Every time you press button P, it scrolls over the ON/OFF of each memory. If the memory is empty, use the buttons D+, H+ and M+ to enter the proper time. Once entered, press P again and it will move to next programming time. Repeat the process until you complete the 17 memories.

Setup of time and date of Timer

- While pressing button press buttons D+, H+ and M+ to enter the proper time and date.

4.2.4.- Temperature controller

The temperature controller is a standard STC–1000 model. The following are the operation instruction:

Main function

Switch the modes between cool and heat; Control temperature by setting the temperature set value and the difference value; Temperature calibration; Refrigerating control output delay protection; Alarm when temperature exceeds temperature limit or when sensor error.

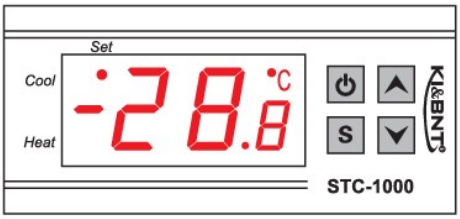
Specification and size

- ◆Front panel size: 75(L)×34.5(W)(mm)
- ◆Mounting size: 71(L)×29(W)(mm)
- ◆Product size: 75(L)×34.5(W)×85(D)(mm)
- ◆sensor length: 2m(include the probe)

Technical parameters

- ◆Temperature measuring range: -50℃～99℃
- ◆Resolution: 0.1℃
- ◆Accuracy: ±1℃(-50℃～70℃)
- ◆sensor error delay: 1 minute
- ◆Power supply: 220VAC±10%, 50/60Hz
- ◆Power consumption: ＜3W
- ◆Sensor: NTC sensor (1PC)
- ◆Relay contact capacity: Cool(10A/250VAC);Heat(10A/250VAC)
- ◆Ambient temperature: 0℃～60℃
- ◆Storage temperature: -30℃～75℃
- ◆Relative humidity: 20～85%(No condensate)

Panel instruction



Display instruction: Three-digit LED +Minus digit + Status indicator light (Status indicator light (Cool, Heat) + Set indicator light (Set)
Key instruction: "S" key: the key to set; "▲" key: Up key; "▼" key: Down key; "⏻": the key to turn on and off the power

Indicator light status instruction

Indicator light	Function	Note
Cool indicator light	On:Refrigeration starts;Off:Refrigeration stops;Flash:compressor delay	Cool、Heat indicator light can not be "on" status simultaneously
Heat indicator light	On: heating starts;Off:heating stops	
Set indicator light	On:parameter setting status	

Indicator light status instruction

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Key operation instruction

1.The way to check parameter:

Under normal working status, press and release "▲" key once instantly, it displays temperature setting value;press and release "▼" key once instantly, it displays the difference value. It back to display the normal temperature display status in 2s.

2.The way to set parameter:

Under controller normal working status, press "S" key for 3s or more to enter parameter modifying mode, and the "Set" indicator light on, screen displays the first menu code "F1".

Press "▲" key or "▼" key to adjust up and down and display the menu iem and the code of the menu item.Press "S" key to display the parameter value of the current menu. Press both "S" key and hold "▲" key or "▼" key simultaneously to choose and adjust the parameter value of the current menu value promptly. After finishing the setting, press and release the "⏻" key instantly to save the parameter modified value and return to display the normal temperature value. If no key operation within 10 seconds, system won't save modified parameter, screen back to display normal temperature.

Screen display "Er" if error appears during parameter saving, and back to normal working status in 3 seconds.

3. Restore system data

When electrified, system will check itself, screen will display "Er" if error exit, please press any key at this time, and it restores default value and enter into normal working mode. it is advised to reset the parameter value under such conditions.

Operation instruction

Under controller normal working status, press and hold "⏻" key for 3s can turn off the controller; Under controller "off" status, press and hold "⏻" key for 3s can turn on the controller.

Under the controller normal working status, screen displays the current measuring temperature value; also the controller can also switch the working mode between heating and cooling.

Controller starts refrigerating with cool indicator light on when the measuring temperature value ≥ temperature set value + difference value, and the refrigerating relay is connected; If the "Cool" indicator light flashes, it indicates the refrigerating equipment is under compressor delay protect status; when the measuring temperature value≤ temperature set value, the Cool indicator light on, and refrigerating relay disconnects.

System starts heating when the measuring temperature value ≤ the temperature set value-difference value, and the "Heat" indicator light on, the heat relay connects; When the measuring temperature ≥ temperature set value, the "Heat" indicator light is off, and the heat relay disconnects.

Menu instruction

Code	Function	Set range	Default	Note
F1	Temperature set value	-50.0～99.9℃	10.0℃	
F2	Difference set value	0.3～10.0℃	0.5℃	
F3	Compressor delay time	1～10 minutes	3 minutes	
F4	Temperature calibration value	-10.0℃～10.0℃	0℃	

Error description

Alarm when sensor error：Controller activate the sensor error alarm mode when sensor open circuit or short circuit, all the running status is closed off with the buzzer alarms, and the nixie tube displays "EE"，press any key can cancel alarm sound, system back to display the normal temperature when the error and the fault is cleared.

Alarm when the measuring temperature exceeds temperature measuring range：Controller activates the error alarm function when the measuring temperature exceeds the temperature measuring range, all the running status is closed off with the buzzer alarms, and the nixie tube displays "HH"，Press any key can cancel alarm sound, system back to display the normal working mode when the temperature restore to normal measuring range.

Safety Regulations

★Danger:

1. Strictly distinguish the sensor down-lead, power wire and output relay interface from one another, and prohibit wrong connections or overloading the relay.
2. Dangers: Prohibit connecting the wire terminals without electricity cut-off.

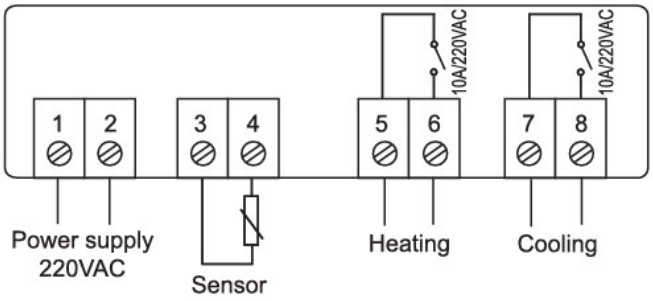
★Warning:

Prohibit using the machine under the environment of over damp, high temp., strong electromagnetism interference or strong corrosion.

★Notice:

1. The power supply should conform to the voltage value indicated in the instruction.
2. To avoid the interference, the sensor down-lead and power wire should be kept a proper distance.

Wiring diagram



Note 1

The temperature controller has been setup from the factory to stop the ozone generator when the shell of the ozone tube reaches 50 °C. The Shell temperature can reach safely 60 °C, so in areas with high temperatures (Above 30 °C), the temperature of the Shell can reach temperatures above 50 °C.

In these cases, the temperature can be increased to 55 or 60 °C, with no problem, by modifying the Temperature limit in the Temperature Controller

5.- Running the equipment

Is important that the startup of the system is done without greywater in the tank.

Once the system has been connected according to points 4.1 and 4.2, you can proceed with the startup of the system. Now, operate the protections (breakers), of the equipment, so they all are in its ON position (up).

After turning the circuit breakers ON, the following check list must be verified:

- Verify, that the pilot light (A), shows a valid Voltage (220 VAC).
- Verify the emergency stop button (E), is in its working position.
- Verify the pilot light (C), is ON
- Verify the timer (G), is on AUTO and with the program in place (See point 4.2.3)
- Verify the LCD Display (D), display: " Fail – Tank Level Low "

If all the above are correct, then you can start filling the tank with greywater (or tap water), so the recirculation stage can be tested.

Once the water activates the level switch (water level above the level switch), the ozone generator shall start automatically, as well as the recirculating pump, as long the Timer program its on at the time of the startup.

In case the Timer is on an off mode at the time of the tests, you can make the system to operate manually, by pressing the manual button of the Timer (Point 4.2.3). If the Pump Starts, then the system can be left alone, by changing the Timer to AUTO mode.

Note 2
Check once a week there is no water inside the Teflon tube between the check valve and the ozone generator. In case water is found, replace the check valve.

Note 3
After some weeks of operation, water testing is required to verify the disinfection and oxidation process of the ozone is achieving its results. For the treated greywater and using a 5 um filter connected at the output pump, the readings of treated water parameters shall be of:

BOD	:	10 mg/l
TSS	:	10 mg/l
CF	:	10 UFC/100 ml
Turbidity	:	5 NTU

In case some of the parameters are still above, the treatment time with ozone must be increased. For further details, contact www.energia-on.com.

Note 4
This ozone generator is intended to obtain a good, treated greywater quality. For this to be achieved, it is mandatory that the greywater is previously filtered under 400 um, prior entering the treatment tank. This means that a primary filter must be used. Any product from https://www.greyflow.net.au/ will work.

Note 5
Once a month the Air Inlet filter of picture N° 2, must be removed and cleaned from the accumulated dust. Otherwise, the air flow will be low and the Temperature sensor will eventually stop the ozonator, leaving the water with no treatment.

6.- Reading the display messages

This version of the Ozone Generator/Controller has included an LCD Display that shows the status of the system, as well as the failure type, in case there is one. This element only controls the status display of the system. The operation logic is made by the internal wiring and control elements such as relays, so it does not depend on the controller to achieve the water treatment.

The following are the Display Messages:

Display	Meaning	Screen
Status OK Waiting	System is running normally, and the equipment is waiting for the next ozonation cycle	
Status OK Ozonating	System is running normally, and the equipment is ozonating the water.	

Failure Tank Level Low	Water in the tank is below the minimal level to operate	
Failure High Temperature	The temperature of the Ozone generator is too high	
Failure Door Open	The door of the equipment its open	
Failure Recirculation	There is a problem with the recirculation system	
Failure Output Pump	There is a problem with the irrigation pump	
Failure Emergency Stop	The Emergency button has been pressed	

The controller as any other electronic device can fail, in terms that the display might stick to a certain value. Even if the system is working OK, the display might get stuck.

In this case, the controller needs to be reset for resuming normal operation.

For this the reset button located in the upper side of the controller box, must be pressed for at least 3 seconds. In the lateral picture, the button is shown inside the yellow circle.