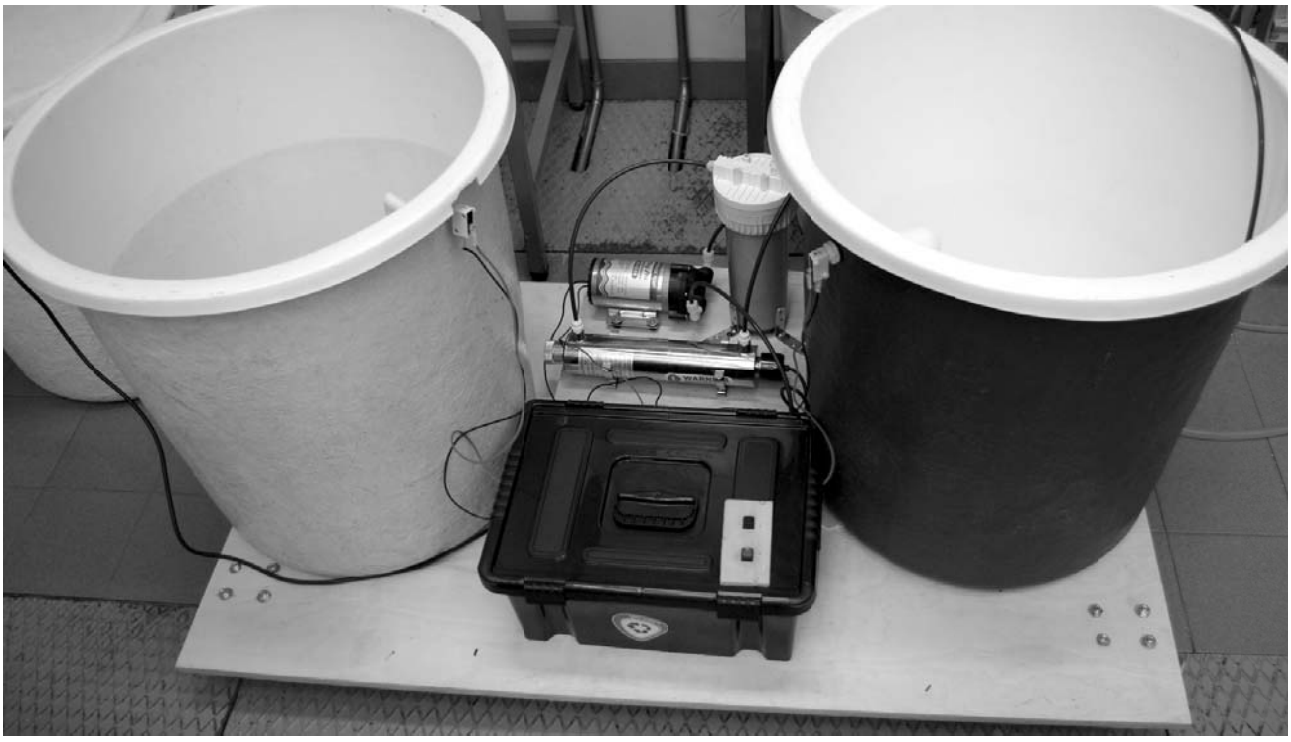
Instituto Superior de Engenharia do Porto

Fluid Disinfection System Based On UV Radiation



USER MANUAL

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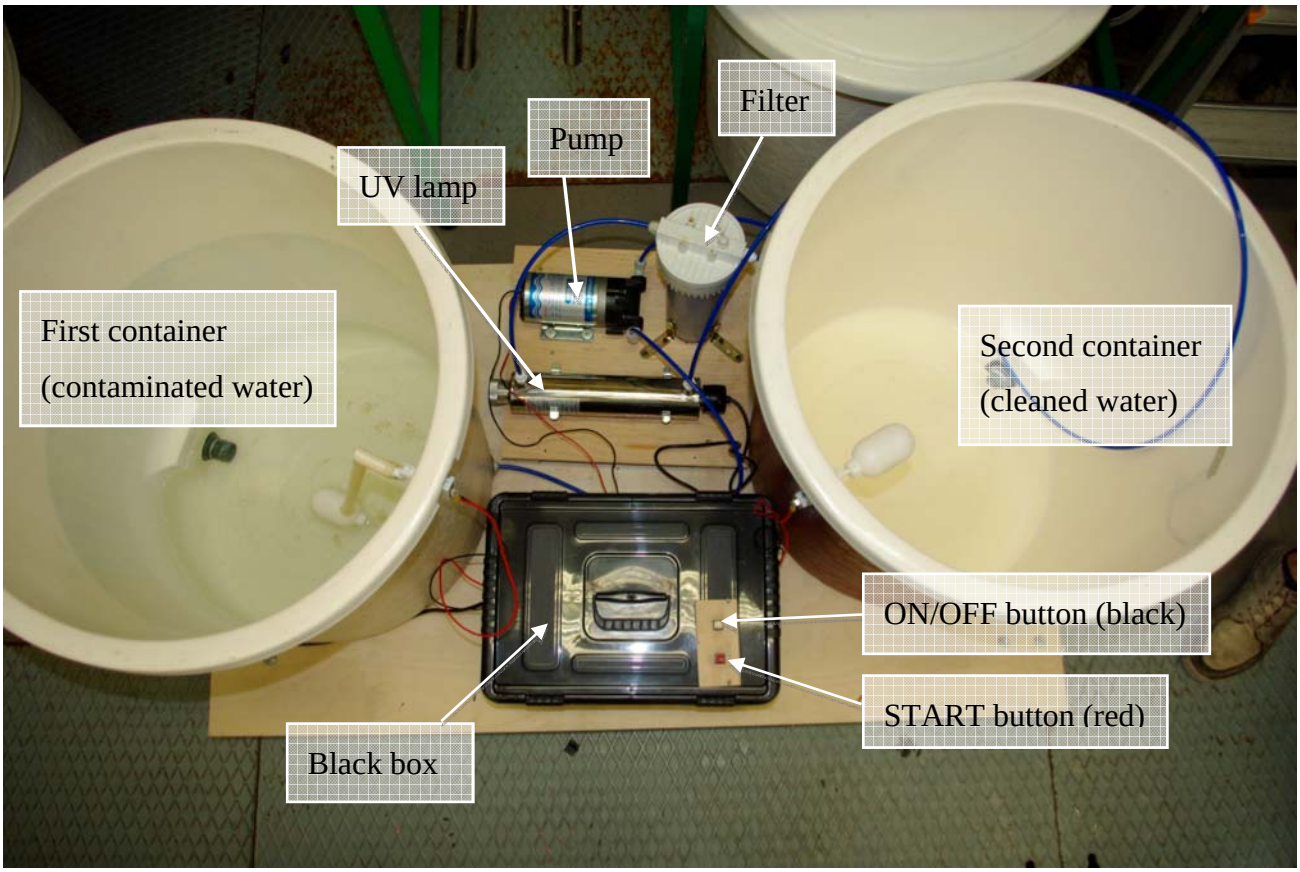
1. INTRODUCTION

The Fluid Disinfection System Based On UV Radiation system is an Erasmus Project Semester project which aim is to clean water what has been used in the ISEP's chemical laboratory. The main objective is to produce clean water by automated system what can be used again in chemical and other experiments and uses. The cleaned water is NOT itended for drinking.

2. SYSTEM SPECIFICATIONS

1. Power supply: 230 V AC
2. Capacity: 1.2 L/min (continious, limited by pump)
3. Approximate containers volume: 100 L
4. Approximate UV lamp working time: 9000 h
5. Automation: PLC



3. PARTS/MODULES

3.1. UV water sterilizer

Model No.: A-140-6

1. Flow rate: Clean water: 1.5 Gpm/6.0Lpm, D1, R.O.water:2.0Gpm/8.0Lpm
2. Voltage: 220~240V, 50/60 Hz
3. UV germicidal lamp: 14W x 1 (Model:UVC-D287T5)
4. Ballast: 14W x 1(Option:Traditional or Electronic type)
5. Dimension: 64 x 340mm
6. Inlet / outlet size: 1/4 inch NPT
7. Max. working pressure: 125 PSI
8. Chamber/housing: 304 stainless steel
9. Quartz sleeve: Model No. SQ230330
10. Lamp failure warning system: LED + Alarm (option)
11. Lamp average life: 9,000hrs

3.2. Mini diaphragm pump

Model No.: RO-6088, King Pro

1. Open flow: 1.2 L/min
2. Pressure: 80 PSI
3. Booster: 24 V DC

3.3. Programmable Logic Controller (PLC)

Model No.: 6ES7212-1BA10-0XB0, SIMATIC S7-200, CPU 212

1. Size: 160 mm x 80 mm x 62 mm

2. Memory: 512 words
3. Local inputs/outputs: 8 DI / 6 DQ

3.4. Electric valve (solenoid valve)

Model No.: YCWS1

1. Two way
2. Direct acting
3. Normally closed

3.5. Relay and socket

Relay model No.: 40.51, Finder

Socket model No.: 95.05, Finder

1. Rated current/max peak current (A): 10/20
2. Rated voltage/max switching voltage (V AC): 250/400

3.6. Power supply

Model No.: S82K-05024, Omron

1. Input voltage: 100 to 240 V AC
2. Hz: 60

3. Voltage output: 24 V DC
4. Amps: 2,1

3.7. Mechanical filter

1. Pore size: 5 µm
2. Height: 10 inches

3.8. Water level sensor

Simple floating water level sensor.

4. OPERATING INSTRUCTIONS

4.1. Starting the system

1. Plug the power cord into a socket.
2. Check if the circuit breaker is switched on (far left in the black box).
3. Check if the black box is sealed properly.
4. Press the black button to turn on the system.
    a. If the power cord has been unplugged or circuit breaker has been OFF, the system will start by pressing only the black button. It's because the PLC has been restarted and it's memory cleared. In other case the system will start after pressing the red button.
5. To stop the system, press black button.
    a. System is also stopped automatically if the the water level has dropped too low on the first conatainer (left) or too high in the second container (right).
    b. To start the system again, press the red button. The system will start only if the water level sensors are allowing it and the system is turned ON (black button).

Normally the circuit breaker should be always turned on and the power cord plugged. Circuit breaker is only for protecting all the the electric parts and it will shut off automaticallt if there is a need.

Both containers can be emptied by the manual valves. Water can be added to the first container by just pouring it in.

4.2. Replacing relays

The system has three relays, each of them is controlling the work of one of the electric part (pump, valve and UV lamp). If something happens to one of the electrical parts a relay breaks down. To replace the relay (after finding out the problem whith the part that failed):

1. Turn off the system (black button).
2. Unplug the main power cord.
3. Open the black box.
4. Find the relay which needs to be replaced.
5. Unplug it from its socket and put in a new one.

4.3. Replacing UV lamp

The UV lamp has a life span of 9000 hours. The UV lamp cord is plugged in to the socket which is located in the black box. If the system is working, and everything is fine, there's a green indicator light on the UV lamps adapter. If the indicator is not working, the lamp is probably also not working.

1. Turn off the system (black button).
2. Unplug the main power cord.
3. Open the black box.
4. Unplug the UV lamps power cord (on the right).
5. Disconnect the pipes from the UV lamp casing.
6. Take the UV lamp off from the platform just by pulling it gently.
7. Remove gently the rubber cap (the UV lamp is connected to it) and pull the lamp out.
8. Disconnect the powe rcord from the lamp.
9. Connect the power cord with the new UV lamp.
10. Put it gently back into its casing.
11. Seal the cap.
12. Put the UV lamp back on the platform.
13. Plug in the UV lamps power cord.
14. Seal the black box.