

# toscano

**DUMO**<sup>®</sup>  
technology



ultralyzer & algacleaner

Ultrasound for Water and Environmental applications

## Algae removal

The mitigation, destruction and growth-inhibition of algae by use of ultrasonic pulses, which avoids chemical usage, is ideally suited for a wide range of applications.



AC-50  
AC-100

**alga cleaner**



## Intensified sludge treatment. More energy from biosolids.

- + Biogas
- Waste for disposal
- + Nutrient removed
- Sludge production
- + Dewatering
- Bulking & Foaming



2x5kW

u l t r a l y z e r



## Cooperation, Research and Knowledge

This innovative technology for waste sludge and biosolids treatment by means of an ultrasonic reactor is the result of many years of development by **Ultrawaves**, a spin-off company from the research activities of Hamburg-Harburg Technical University, lead by Professors Dr.Eng Uwe Neis and Dr.Eng Klaus Nickel.

**Toscano:** Manufacturer of electronic equipment and systems for water control, with experience in ultrasonic treatment for algae mitigation in cooperative research with the University of Huelva.

### A wide range of applications

#### Sludge treatment

Anaerobic digestion is intensified by treating activated sludge with the DUMO Ultralyzer. This increases biogas, reduces retention time and the quantity of sludge for disposal.

#### Wastewater treatment

Ultrasound breaks the cell contents which are available as carbon source for the denitrification process, increasing nitrogen degradation and avoiding the use of chemicals.

#### Bulking and Foaming

Filamentous bacteria are damaged by continuous ultrasound application. With the sonication of a partial flow of return sludge, the micro-organisms are eliminated easily.

#### Biomass treatment

Sonication using ultrasound applied to the biomass from the fermenter, or the secondary fermenter, provides intensified anaerobic degradation and increases biogas production.

#### Water & Wastewater disinfection process and organic contaminants

For disinfecting water with high solid concentrations (turbidity) ultrasound is ideal and makes UV rays more effective, reducing the use of expensive chemical methods.

Manufacturing Plant



TUHH University



TOSCANO Manufacturing Plant

## From Standard to Custom Designs

### Engineering, manufacturing and service

We provide one-stop capability: from state-of-the-art components to advanced engineering and customized systems.

With over 30 years of experience in electronics for water control and industrial applications, we are able to provide a full range of solutions from standard off-the-shelf ultrasonic devices for algae control, to complete turnkey systems for Waste Water Treatment Plant. (WWTP).

Toscano also has an in-house team of engineers available to help with any design requirements or specifications you may need.

“Our team of experts can efficiently help you find the right solution for your needs.”

As an ISO-9001 certified manufacturer, all Toscano products and systems are fully tested with our own functional hydraulic and electrical bench tests.



## ultralyzer

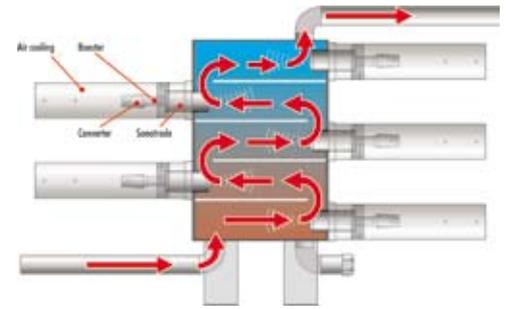
### Electronic and hydraulic control, for best use of the Ultrawaves Reactor

The capacity of the reactor has been optimized as a compact unit that achieves homogeneous sonication throughout the whole treated flow (29 liters). A true "micro-system" compared with conventional treatment technologies.

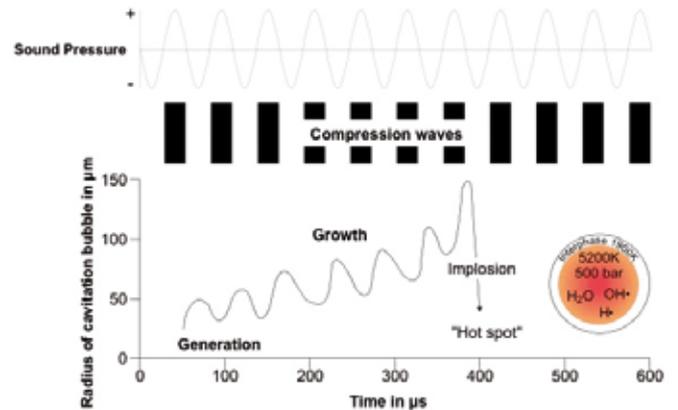
The control system for flow and pressure, in combination with the ultrasonic sonication power and amplitude, produces enormous cavitation forces which break up the biomass structure while maintaining stable and safe operation of the reactor.

Cavitation is the creation, growth and implosion of these microscopic bubbles. Cavitation bubbles created by low frequency ranges (about 20 kHz) reach up to 5000° C temperature and 500 psi. These extreme conditions cause cell disintegration and biomass polymer break-up.

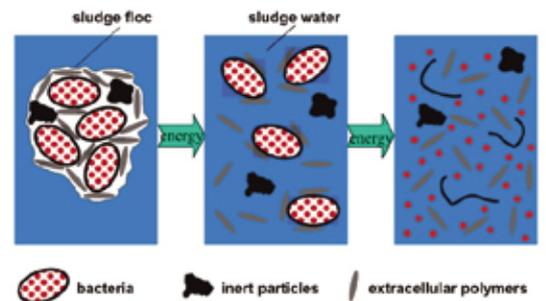
DUMO Ultralyzer System uses a special sonotrode that operates at 20 and 35 kHz frequency and 25-50 W/cm<sup>2</sup> intensity - optimum parameters for cellular break-up of sludge micro organisms. As a result, the energy demand of this process is significantly lower compared with other ultrasonic systems.



### Ultrasonic Cavitation



### Disintegration of biosolids



Sonotrode 1 kW

### The power of High Energy Cavitation



Discover DUMO Ultralyzer



# algacleaner

Destruction and growth-inhibition of algae by ultrasonic energy pulses

Ultrasounds are present in a wide range of frequencies, beyond the range of human hearing (20 kHz - 10 MHz).

Sound propagation in a medium such as water is carried out by continuous waves transition through the medium in two phases: rarefaction (negative pressure) and compression (positive pressure).

Our transducer offers a coupling technology that matches the transmission pulses to the water density, resulting in more effective penetration of the ultrasonic waves, delivering more acoustic pressure over greater distances.

DUMO Algacleaner emits pulses that cause damage in vacuoles or cell tissue (fig.1) and inhibits algal growth process and vital functions (fig. 2)

The system emits different harmonic frequencies, creating waves of different length, generating effective wavefronts against algae by the balance of parameters such as wave shape, wave matching, pressure, and power.



Discover DUMO  
Algacleaner

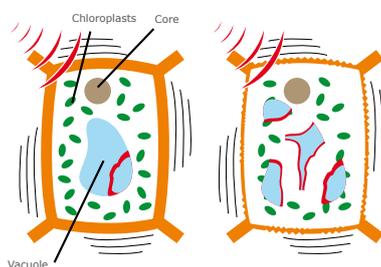


Fig. 1

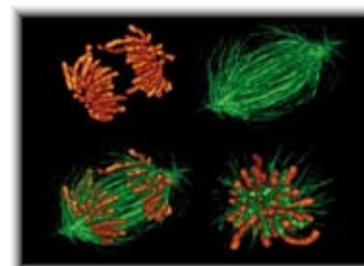
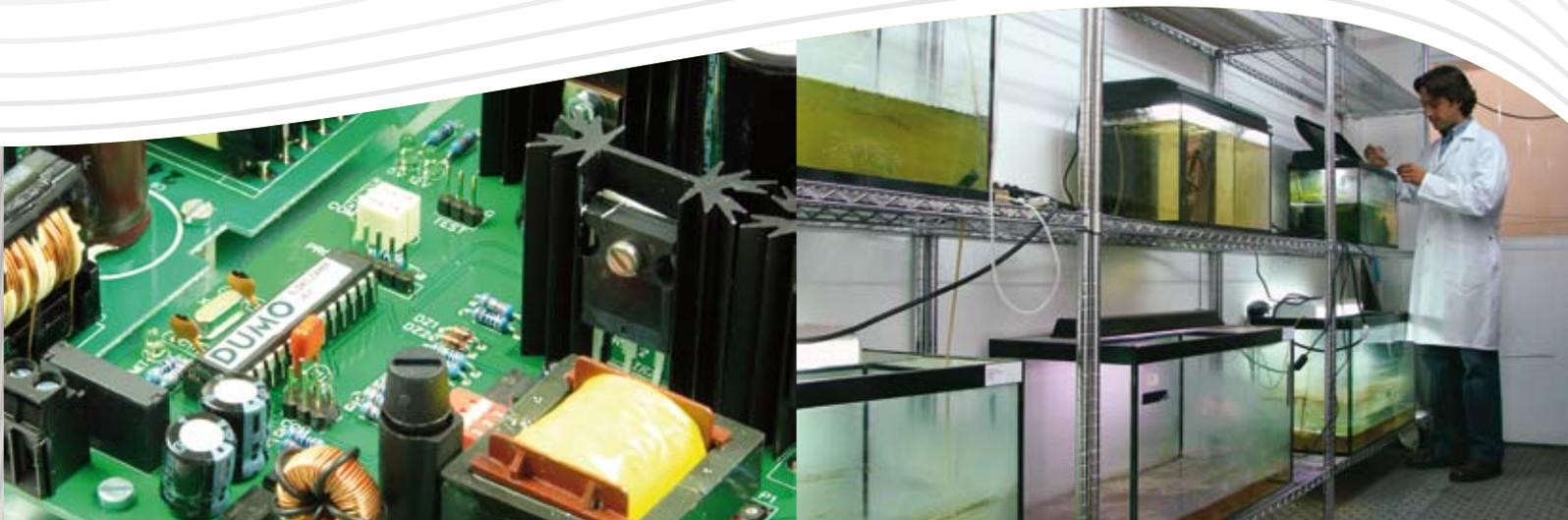
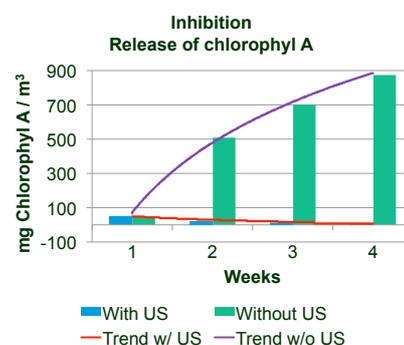
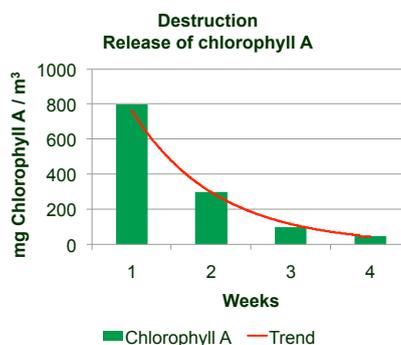


Fig. 2



## Engineering made to last under continuous working conditions

### DUMO Control System

#### DUMO Control System

The complete development in-house of design, manufacturing, assembly and testing ensures high-quality systems integration, reducing delivery time and providing the best overall solution and service.

Our full compact "plug & play" DUMO Ultralyzer includes:

- Sludge pre-conditioning by our unique "DST" process.
  - Hydraulic bench, pumps, piping and regulation valves.
  - Ultrawaves Reactor
  - Flow and pressure control
  - Redundant safety system
  - Control Panel
- 
- Programable Logic Controller
  - Remote bus interface
  - Automatic cleaning
  - GSM-based alarm reporting
  - Scada & WEB monitoring
  - Pump power drives
  - Electrical protection

#### DCP® DUMO Control Power.

The amplitude is regulated automatically by the system and the power is checked automatically against pressure changes and consistency of the sludge. This provides the best results to obtain maximum benefit from the installation. (Fig.1).

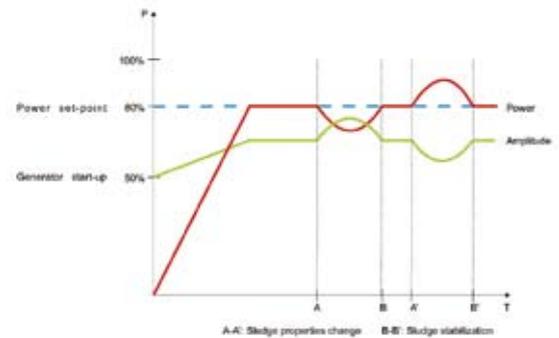
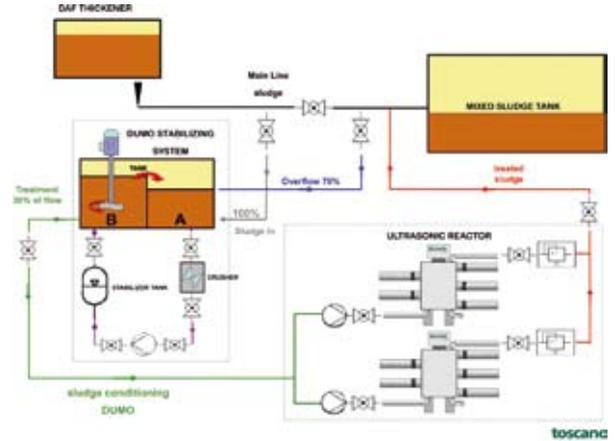


Fig.1

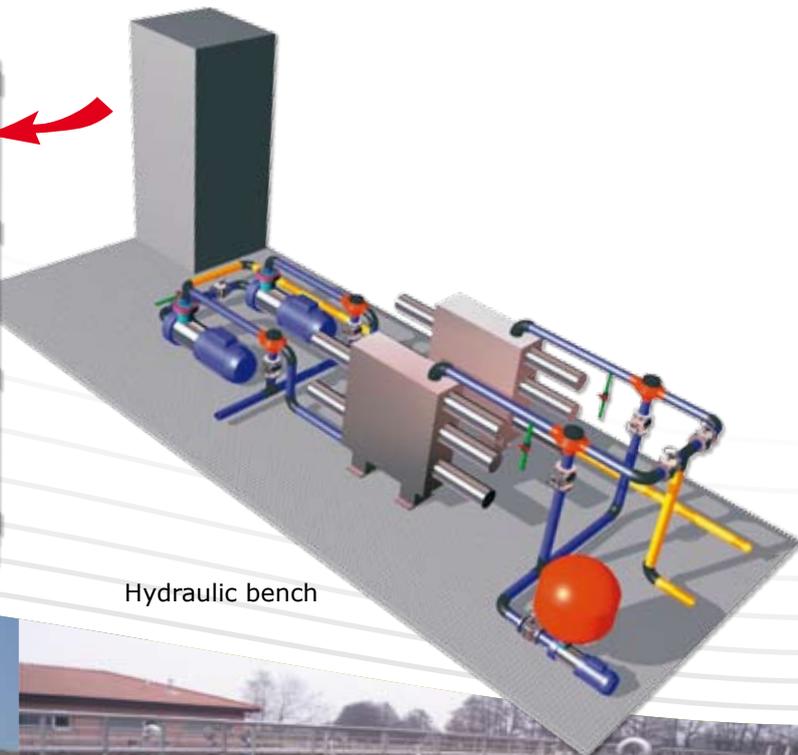
Scada & WEB monitoring



Control panel



Hydraulic bench



**Intensified digestion & biogas**



**Removal of bulking sludge**



## The most effective and ecological way to prevent algae

### DUMO Algacleaner®

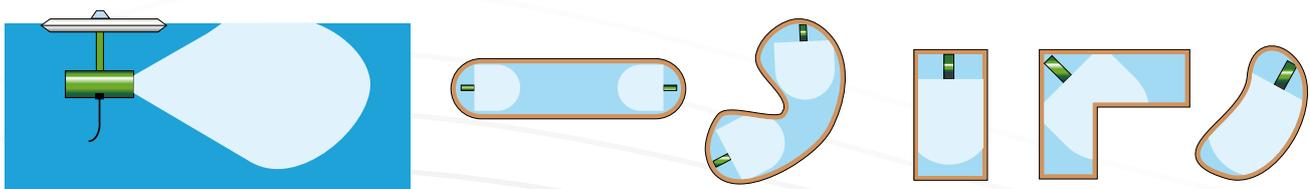
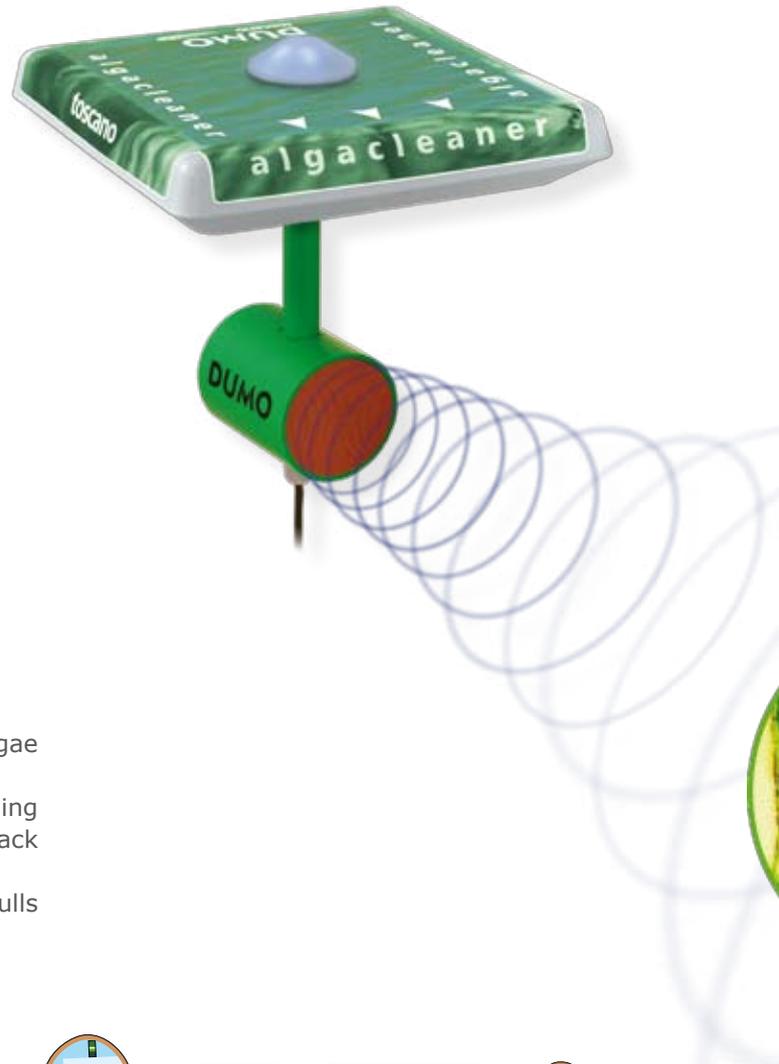
It is now possible to alleviate algae bloom in your pond, irrigation reservoir, lake, fountain, cooling towers, etc., without the need for chemical products. Our ultrasonic equipment will ensure algae is eliminated in the most sustainable method possible.

Installation its easy. All you need do is float the device in the water and connect it to a power source or solar panel.

### Advantages

- |   |   |
|---|---|
|  Ecological  |  Easy to install       |
|  Non-toxic<br>Causes no harm to humans, animals or plants. |  24/7 service          |
|  Clean<br>No need for chemical products                    |  Low power consumption |
|  Minimal maintenance                                      |   |

- Eliminates green, blue and many other species of algae and cyanobacteria, depending upon extant conditions.
- Significantly reduces the use of chlorine in swimming pools while eliminating problematic green and black algae.
- Extremely effective in removing bio-film from boat hulls and tank, pond and swimming pool walls.



**Irrigation**



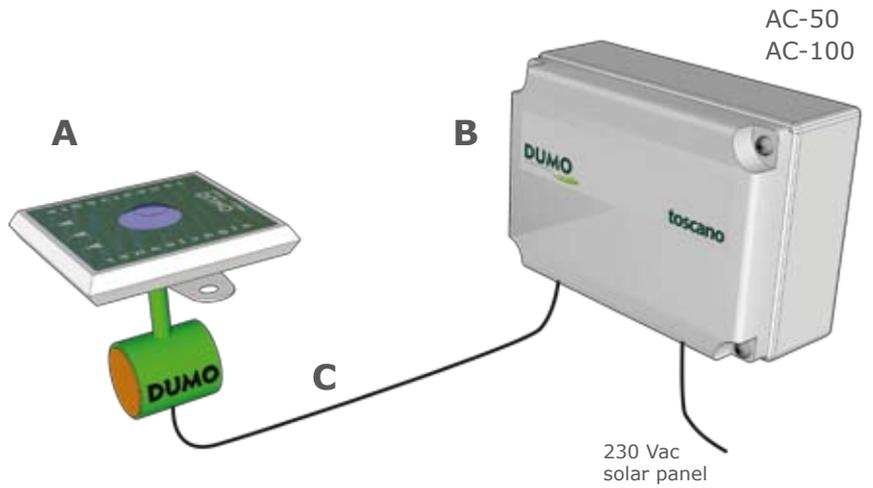
**Ponds & lakes**



**Fish farms**

## System description

- A. An ultrasonic transmitter attached to a float is placed under the surface of the water.
- B. An ultrasonic electronic generator to activate the transmitter is installed in a waterproof area powered by a 230 V mains circuit or solar panel.
- C. A 20-metre cable connects the transmitter and generator.



**Pools**



**Marine**



**Cooling towers**

## u l t r a l y z e r



Seville (Tablada)



Madrid (La Gavia)



Brazil (Belo Horizonte)



Mallorca (Son Servera)



Dublin (Shanganagh)



Barcelona (Montornes)



Ciudad Real (Tomelloso)



Bilbao (Arriandi)



Murcia (Lorqui)



Biogas plant - Bordscholmerland



Denitrification pilot plant - Barcelona

# algacleaner

Compiled by Grupo Bioindicación Sevilla and Huelva University.

Samples taken by Toscano before and after installation of the DUMO Algacleaner in the San José (Seville) irrigation reservoir.

### Conclusions

"[...] The results obtained show a substantial difference between before and after ultrasonic treatment. [...] Hence, significant changes can be seen in the volume of filamentous algae due to the treatment. Likewise, the breakage of the filaments is obvious, the process having left the same scattered, fragmented and missing cells [...]"

"[...] The chlorophyll analyses conducted show a reduction in both mg of chlorophyll A/m3 (62.6 before to 40.31 after) and the number of cells (112.7 before to 72.6 after). The results of the Margalef index and the D430/D665 relationship show higher values in connection with the release of pigment into the milieu as a result of the fragmentation of the filamentous algae caused by the ultrasonic signal, in addition to the active chlorophyll [...]"

"[...]The effect of the ultrasonic process has destroyed cells and thus active chlorophyll and the productivity of the phytoplankton. This result, taking into account that the sampling was carried out under similar conditions, can only be attributed to the ultrasonic treatment, as the tendency for the temperature to rise has a direct effect on an increase in the growth of blue-green algae, which has not been happening [...]"



Irrigation



Ornamental pond



Public park



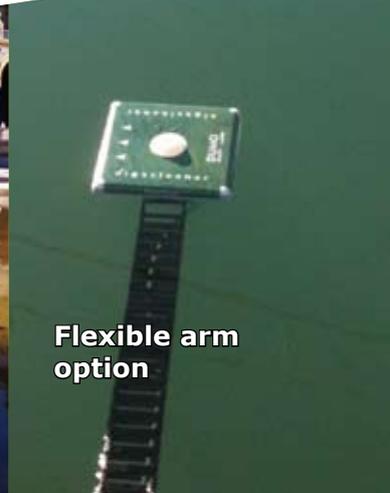
Water treatment



Solar panel option



Custom design for ornamental channel



Flexible arm option



360° field of action (custom design)

## ultralyzer



## reactor

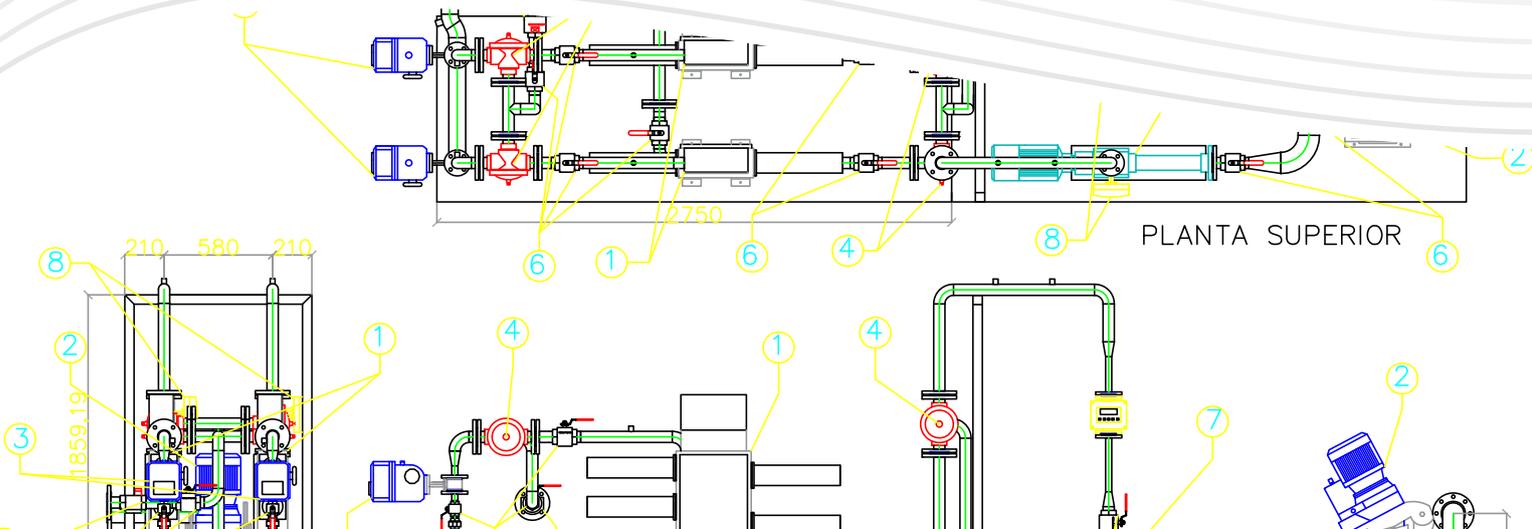
Treatment flow	100 m <sup>3</sup> /day
Plant size	120.000 P.E. (according WWTP)
Sludge retention time	1-2 minutes
Nominal power	5.000 (1.000 W/generator)
Reactor effective volume	29 liters
Max. input pressure	2 bar
Max. medium viscosity	0,5 Pas
Solids concentration	max 9%
Flow rate	up to 2m <sup>3</sup> /h



## algacleaner

### Technical specifications

Model	AC-50	AC-100
Power supply	230 Vac (50/60 Hz) or 24 Vdc	
Length of transmitter cable	20 m	
Average/maximum consumption	60/90 W	80/130 W
Field of action	50 m	100 m
Pulses/bursts/ultrasonic waves	Multifrequency with automatic sequence changes	
Alarm output of no-emission	N.C. auxiliary contact (3A 250V)	
Electrical protections	Surge/Overheating/Breakage of transmitter cable	
Control box dimensions	240 x 190 x 90 mm	300 x 200 x 120 mm
Environmental protection	IP56	
Pilot lights	EMISSION (outside), VOLTAGE (inside)	
Options	Solar panel 24 Vdc / 20 meter cable extension / Flexible arm	
Size and weight of package	320 x 370 x 350 mm / 7,2 Kg	320 x 370 x 350 mm / 7,3 Kg



## Support & service from a single source

Technical support and training are among the most important elements in successful implementation of any technology, but especially in biological environments. We provide both on-site training and technical workshops to promote user skills, increase productivity and ensure high ROI.

The professionals of Toscano are product specialists, experts in satisfying your specific needs. They provide installation, training and technical support for DUMO Ultralyzer and Algacleaner to insure the success of your project.



Technical workshops & trainings



## toscano web control

- Remote control and monitoring.
- Discrete access levels: Admin, Support, User...
- Data security.
- Alert reporting.
- Logging of monitored data for historical reporting.



# toscano

Electronics for the environment

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General Catalogue

Pump Controllers

Water & sewage Control Solutions

Electromagnetic Flowmeters