Plant Experiment and Research System

Phytotron • Growth Chamber • Water Treatment



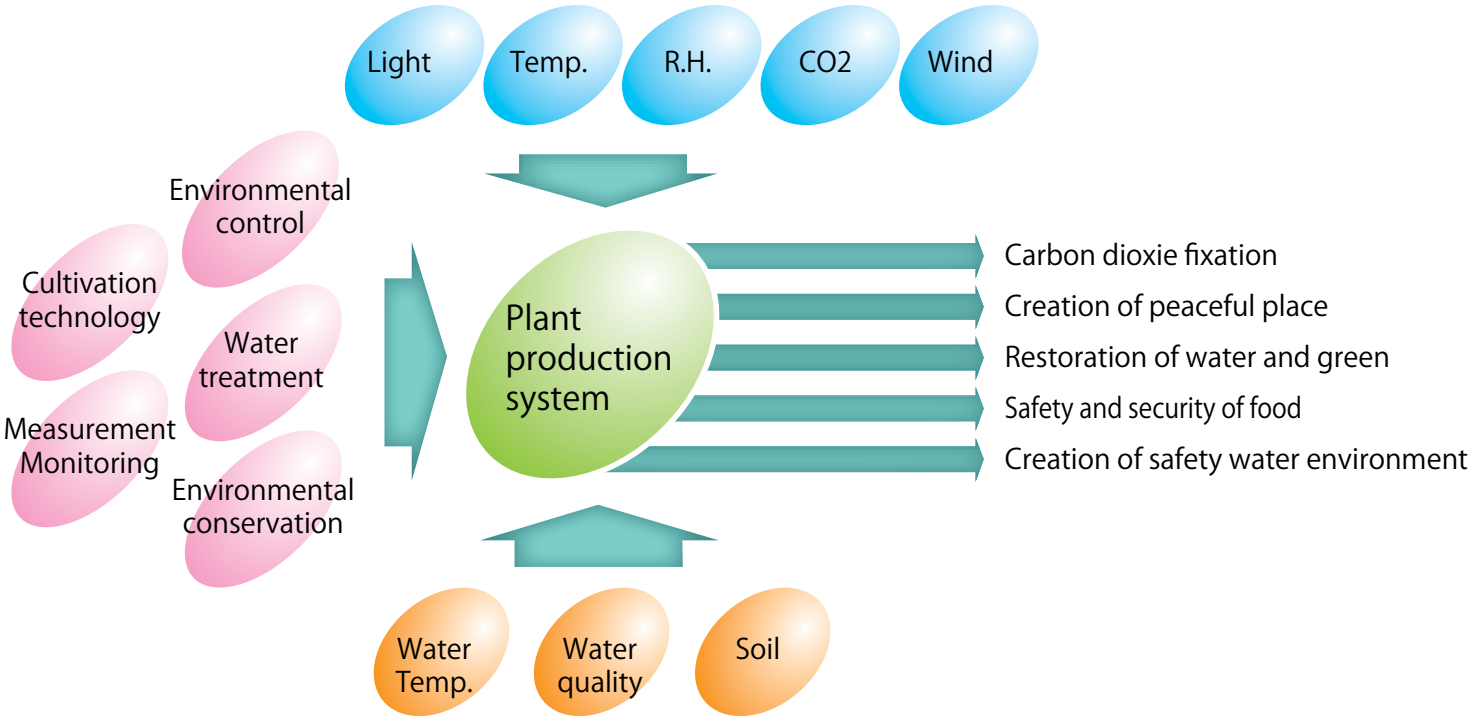
- Simulation of optimal environment for overall experiment, research and cultivation in biology
- Various systems such as artificial weather control room to water-treatment system
- Customizable size from laboratory level to commercial level



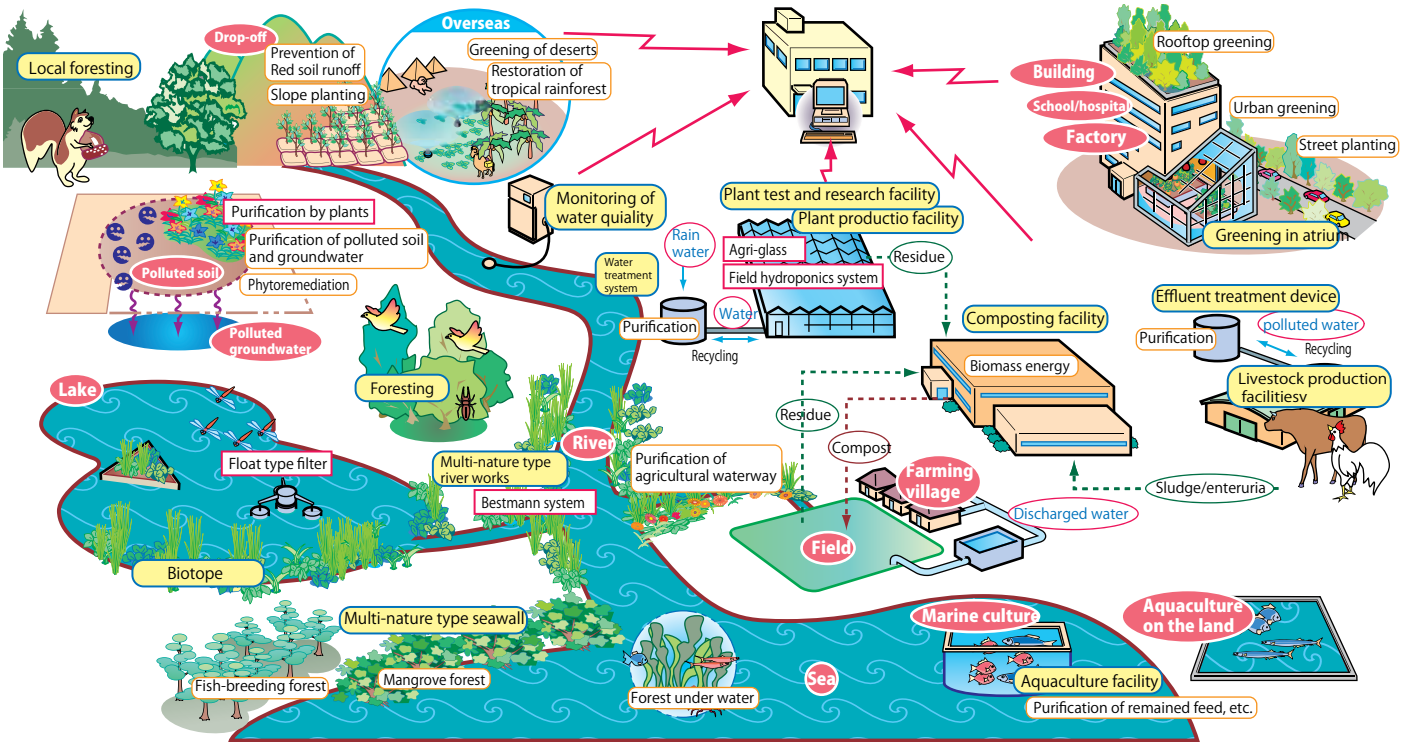
ESPEC MIC CORP.

Our purpose is to contribute food safety and security, and to revive the natural beauty earth. For this, we offer the plant production system and machine to support R&D and food production.

Key technology



Business filed <Providing environment preservation system utilizing ability of nature>



Utilization of natural light

Agri-glass (infrared cut filter)

Agri-glass is infrared cut filter glass for a greenhouse. It can transmit photosynthetically active radiation and ultraviolet radiation (UV-A) without infrared radiation. Therefore, it suppresses temperature rise inside a greenhouse, and it can reduce thermal load by 30 % when air-conditioner driving in summer. Because of that Agri-glass is made simple way, it is lightweight and low cost.
It can be used widely from R&D for plant to production of flowering plant.

Drastically reduce infrared radiation

Agri-glass transmits photosynthetically active radiation (400-700nm) and reduces infrared radiation (700nm-1mm).

Transmittance of UV-A

Agri-glass transmits UV-A (320-400 nm) that is necessary for plant growth.

Easy recover

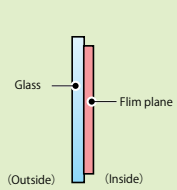
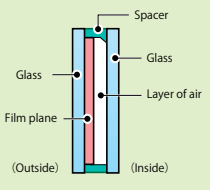
Agri-glass can be easily recovered from existing glass on a greenhouse.

High durability

Agri-glass keeps that performance over 10 years.

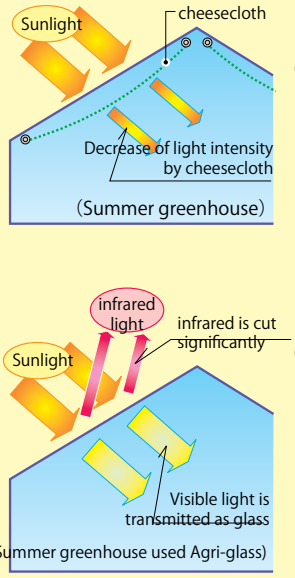
Shatterproof

Agri-glass can be used with security in windy area by shatterproof.

MODEL	TFG-S3	TFG-S4	TFG-S5	TFG-W4	TFG-W6
Thickness of glass	3 ㎜	4 ㎜	5 ㎜	10 ㎜ (air space 4 ㎜)	12 ㎜ (air space 6㎜)
Temperature range	-20～+60 ℃				
Structure	Single layer type 			Muti type 	
Manufacturable maximum size	W 1150 ㎜				

※ Please contact us for more information.

Feature of Agri-glass



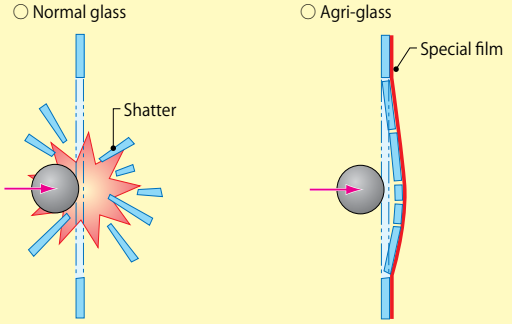
Case of normal glass

- Normal glass cannot reduce infrared radiation.
  Cheesecloth reduces infrared, however it also reduces PAR.
- Ground temperature increases.

Case of Agri-glass

- You don't need a cheesecloth to reduce infrared in your greenhouse.
- Ground temperature decreases about 10ºC than greenhouse.
- Air conditioning cost is reduced by about 30%.
- Thermal effect in the winter.

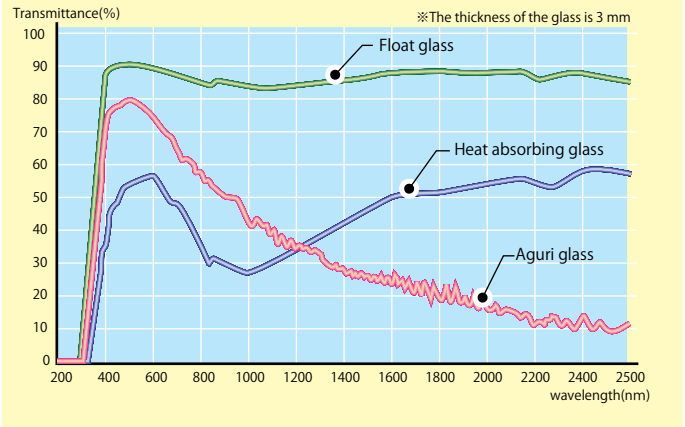
Scatterproof effect of Agri-glass



When glass is broken, it is dangerous shards of glass are scattered.

Special film of Agri-glass prevent chip scattering.

Spectral transmittance of Agri-glass



Natural sunlight use

Environmental Control greenhouse

TAH (Agri-glass used greenhouse)

- TAH is Agri-glass used greenhouse for R&D and commercial production.
- Using Agri-glass on outer wall of greenhouse, can reduce running cost by suppressing air conditioning load in the summer.
- It is preparable that various size (from compact to large) and requirements.
- It is also preparable that non-closed and closed system of biohazard.
- Temperature, humidity, CO_2 concentration, and movable skylight is controlled automatically.
- We have a lot of optional equipment (i.e. light supplement, cultivation equipment, air conditioning system, control device, etc.)

Greenhouse type

○ Large roof type

・Large roof type single-span greenhouse. It is best for small to medium sized facilities, and possible to make attached type.

・Agri-glass (3-5 mm) can transmit PAR and UV-A which are necessary for plant growth, and reduce ari-conditioner cost.

○ Venlo type

・Multi-span greenhouse has a lot of results of introduction. It has high eave and excellent light shaft, therefore it is fit for medium and large size facilities.

・This type has high durability, and it is able to stand 50 m/s of wind speed. Moreover, it is responded flexibility to facility expansion.

Construction example

○ Closed type greenhouse

○ Sightseeing greenhouse (botanical garden)

Natural sunlight use

Phytotron • TP series

Phytotron TP series is solar light and outdoor installation type Agri-glass chamber. This chamber can save energy by using Agri-glass. This series have four kinds chmber, TPE (standard type), TPL (mini type), TPEB (biohazard compliant type), and TPH (special use). In addition, we can customize this chamber as your needs.

TPE (Standard type)

- TPE is the standard type Phytotron which utilizes Agri-glass to save energy.
- This is an ideal environment for growing panels.
- This system can be customized to be an independent type or connection type.
- Optional additional products are also available (i.e. supplemental light, cultivation system, photoperiod treatment system, etc.).
- Air flow is controlled throughout the chamber to create the optimal environment.

Model		TPE
Performance	Temperature range	+15～+35 ℃
	Humidity range	55～80%RH (humidification control)
	Temperature and humidity fluctuation range	± 1 ℃ / ± 7 %RH
	Wind velocity	below 0.5 m/s (0.5 m on the floor)
Structure	Exterior	Agri-glass (single panel)
	Air conditioning part	Insulation panel
	Insulation material	Hard urethane foam
Air conditioning	Refrigerating method	Single stage refrigeration (air cooling)
	Heating method	Heater
	humidification method	Humidifier
Power		AC200V 3 φ 50/60 Hz
Fittings		Cable port, Outlet

Standard dimension

Model	Exterior (W × D × Hmm)	Interior (W × D × Hmm)	Floor area
Type 3	2000 × 3400 × 2000	1800 × 1800 × 1800	3.3 ㎡
Type 5	2900 × 3400 × 2000	2700 × 1800 × 1800	4.9 ㎡
Type 6	3800 × 3400 × 2000	3600 × 1800 × 1800	6.5 ㎡
Type 12	3800 × 5200 × 2000	3600 × 3600 × 1800	13.0 ㎡

Variation

○ Mini type (Type 3) ※ Low-end model

○ Type 5

○ Attached type

○ Day length control system※1

○ Light supplement device
+Day length control system※1

○ Light supplement device

※ 1 You can adjust freely day length control with shading box. It is active in acclimatization research such as blooming of flowers and ornamental plants and bio-seedlings.

Natural sunlight use

Phytotron • TP series

TPEB (Biohazard compliant type)

- TPEB is a closed type phytotron that is biohazard (genetically modified) compliant (P1P level).
- In order to save energy while creating the ideal environment for plants, Agri-glass is used.
- An effluent treatment system is equipped as standard equipment.
- Air flow is controlled throughout the chamber to create the optimal environment.

anterior chamber

Model		TPEB
Performance	Temperature range	+15～+35 ℃
	Humidity range	55～80 %RH (Only humidification control)
	Temperature and humidity fluctuation range	± 2.0 ℃ / ± 10 %RH
	Wind velocity	Below 0.5 m/s (0.5 m on the floor)
Structure	Exterior	Agri-glass (pair glass type)
	Mechanical room (anterior chamber)	Insulation panel
Air conditioner	Refrigerating method	Single stage refrigeration (air cooling)
	Heating method	Heater
	Humidification method	Humidifier
Power		AC200V 3 φ 50/60 Hz
Fittings		Supply and exhausting filter unit, Drainage filtration device, Outlet, Water Tap, room light

Standard dimension

Model	Greenhouse (W × D × H ㎜)	Mechanical room (W × D × H ㎜)
Type 12	4000 × 3000 × 2500	4000 × 2500 × 3000
Type 15	5000 × 3000 × 2500	5000 × 2500 × 3000
Type 18	6000 × 3000 × 2500	6000 × 2500 × 3000

TPH (Special measures type)

- TPH is a phytotron that can be customized from single type building establishment type upon request.
- It comes in both closed and non-closed types with biohazard compliance (from P1P to P2P level). Optional products are available (i.e. supplemental light, cultivation system, photoperiod treatment system, etc.).
- Similar to TPE, TPH is also equipped with Agri-glass to save energy while creating an ideal environment for the plants.
- Users also have the ability to select an air conditioning system.

Stand-alone type

Independent type

Independented multispan type

Attached to building type

Rooftop installation type

Attached to building type

Attached to building type

Attached to building type

Model		TPH
Performance	Tempeerature range	+15～+35 ℃
	Humidity range	55～80 %RH (Only humidifier control)
	Temperature and humidity fluctuation range	± 2.0 ℃ / ± 10 %RH
	Wind velocity	Below 0.5 m/s (0.5 m on the floor)
Structure	Exterior	Agri-glass (pair glass type)
	Air conditioning part	Self-contained air conditioner
	Insulation material	Hard urethane foam
Power		AC200V 3 φ 50/60 Hz

※ This is only an example of specifications in standardized facility. Please contact us for more information.

Artificial light use

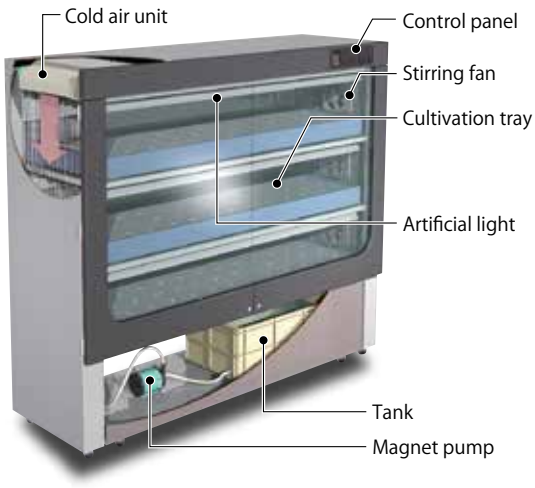
Growth cabinet (Plant cellar)

TAPS-1

- TAPS-1 is a high performance type of plant cellar which can control temperature, humidity and carbon dioxide concentration.
- TAPS-1 is included step program with touch panel and it can utilize Full-scale cultivation test.
- Artificial light source can be combined with LED, fluorescent lamp, etc.(optional).
- Circulating hydroponic system is equipped as standard.

Model	TAPS-1
Exterior dimension	W1540 × D780 × H2030 mm
Number of cultivation bed	3 stage
Temperature (Light ON)	20℃ – 25 ℃ ± 1.0 ℃
Temperature (Light OFF)	15 – 20 ℃ ± 1.0 ℃
Humidity	50 – 90 %RH ± 10 %
Carbon dioxide concentraion	– 3000 ppm
Light source	Whight LED × 4
Instrumentation	Touch panel
Program function	○
Hydroponics system	○
Power	AC200V 15A
Weight	About 350 kg

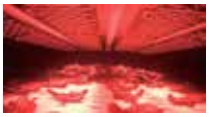
Structure



Light source


LED model

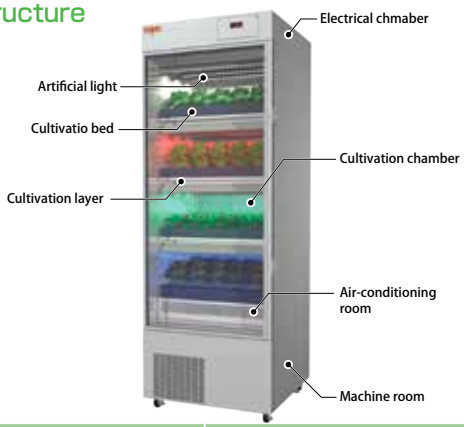

FL+LED model



TAPS-12T、TAPS-9T、TAPS-6T

- These are popular type of plant cellars which can only control temperature.
- Slim type fluorescent lamp is included as standard light source. It is also possible to combine with LED (optional).
- Circulation type of hydroponic system is also installed as standard.
- They can work with a single electrical outlet of 100 V and 15 A
- You can choose from three types(12T, 9T and 6T) according to installation space.

Structure



Model	TAPS-12T	TAPS-9T	TAPS-6T
Exterior dimension	W1540 × D780 × H1980mm	W1240 × D780 × H1980mm	W690 × D750 × H1900mm
Number of cultivation bed	4 stages		
Temperature (Light ON)	20 – 25 ℃		
Temperature (Light OFF)	15 – 20 ℃		
Light source	White LED × 3	White LED27 W × 4	Plate type white LED
Instrumentation	Simplify instrumentation		
Program function	Day and night switching		
Hydroponics system	Standard equipment		
Power	AC100 V (120 V) 15 A	AC100 V (120 V) 12 A	AC100 V (120 V) 10 A
Weight	About 300 kg	About 250 kg	About 150 kg

Artificial light use

Growth cabinet Air

Growth cabinet・TGC (Plant growth chamber)

- TGC is a factory-made, integrated-type growth chamber. Users can use this chamber immediately upon introduction.
- Air flow is introduced on ground level in order to protect the plants from damage by direct wind.
- This chamber can be customized upon request, and the light source can be chosen from a few options (i.e. fluorescent lamp and LED).

	Model	TGC-500	TGC-700
Performance	Temperature range	+15～+40 ℃	
	Humidity range	55～85 %RH	
	Temprature and humidity fluctuation range	± 1℃ / ± 10 %RH	
	Light intensity	2～50,000 lx	
	Wind velocity	Below 0.5 m/s (center in the vessel)	
Air conditioning	Refrigeration method	Single stage refrigerating	
	Heating method	Heater	
	Humidification method	Humidifier	
Light source		Fluorescent light lamp or metal halide lamp are selectable	
Dimension in vessel (mm)		W850 × D500 × H850	W850 × D850 × H850
Exterior dimension (mm)		W1000 × D850 × H2050	W1000 × D1200 × H2050
Power		AC200V 3 φ 50/60 Hz	

○ 4 chambers

○ Double stack

○ Light pipe

TGL (Space saving type)

- TGL is a small scale growth chamber which is assembled with an insulated panel on 1 square maters of floor space.
- The standard light source installed in this growth chamber is a three-wavelength fluorescent lamp.

x per square meter, and the second model comes with 50,000 lx per square meter.

- Optional products, such as cultivation cabinet, are also available.

	Model	TGL
Performance	Temperature range	+5～+40 ℃
	Humidity range	50～80 %RH (humidifying control)
	Temperature and humidity fluctuation range	± 1 ℃ / ± 7 %RH
	Light intensity	30,000 lx or 50,000 lx (under 0.5 m from the light)
	Wind velocity	Below 0.5 m/s (0.5m on the floor)
Structure	Exterior	Color steel
	Interior	Stainless steel
	Insulation material	Hard urethane foam
Air conditioning	Refrigeratioin method	Single stage regrigerating (air cooling)
	Heating method	Heater
	Humidification method	Humidifier
Light source		Three band type twin fluorescent lamp
Interior dimension		W1200 × D800 × H1800 ㎜
Exterior dimension		W1800 × D900 × H2300 ㎜
Floor area		1.0 ㎡
Power		AC200V 3 φ 50/60 Hz

○ Standard type

○ Attached type

※ There is another type which can control CO_2 concentration and not control humidity.

Artificial light use

Growth chamber TG series

TGH (Continuous dimming)

- TGH is a high performance growth chamber. This chamber can reproduce the high luminosity condition that plants need.
- Nearly natural light conditions are made possible with the use of LED, HID lamps, and electrodeless lamps.
- The lamps can make over 100,000 lx in light intensity, and the dimming settings can be controlled continuously anywhere between 60 to 100 %.
- Temperature, humidity, CO_2, concentration can all be

Model		TGH
Performance	Temperature range	+15～+40 ℃
	Humidity range	50～90 %RH
	Temperature and humidity fluctuation range	± 1℃ / ± 7 %RH
	Light intensity	50,000～100,000 lx (under 1m from the light) ※ it is possible to control and display in photon
	CO_2 concentration	Atmospheric concentration～2,600 ppm
	Wind velocity	Below 0.5m/s (0.5m on the floor)
Structure	Exterior	Color steel or PVC steel
	Interior	Stainless steel
	Insulation panel	Hard urethane foam
Air conditioning	Refrigeration method	Single stage refrigerating (air cooling)
	Heating method	Heater
	Humidification method	Humidifier
Light source		LED, HID lamps, and electrodeless lamps
Power		AC200V 3 φ 50/60 Hz
FIttings		Observation window, Cable port, Ventilator, Room right, Water tap, Outlet

○ LED

○ electrodeless lamps

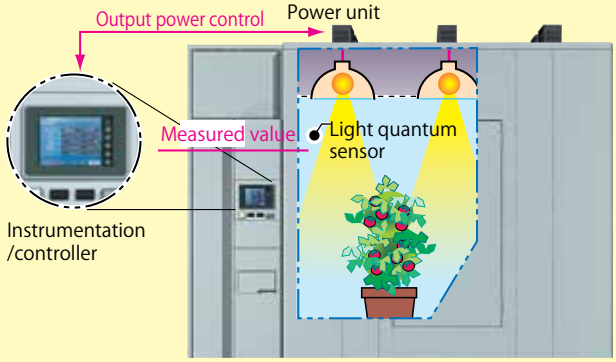
○ HID lamps

Standard dimension

Model	Exterior (W × D × H ㎜)	Interior (W × D × H ㎜)	Floor area
Type 3	2600 × 1800 × 2720	1720 × 1720 × 1850	2.9 ㎡
Type 5	3500 × 1800 × 2720	2620 × 1720 × 1850	4.5 ㎡
Type 6	4400 × 1800 × 2720	3520 × 1720 × 1850	6.1 ㎡

○ Instrumentation

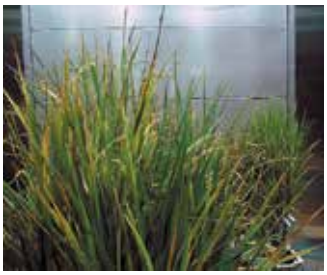
Dimming system (PAT.)



※ This system controls dimming of light with sending a signal to the ballast for maintaining the setting value, with comparing between measured value of light quantum sensor and the set value of instrumentation.

○ Example of installation

○ Example of cultivating



Artificial light use

Growth chamber TG series / incubation room

TGE (Standard type)

- TGE is a standard type growth chamber that is assembled insulation panels.
- A HID lamp for plants, is used as the light source. This specific light source reproduces a light environment that is very similar to natural sunlight.
- This chamber can be prepared in a customized size depending on the installation space and type.

	Model	TGE
Performance	Temperature range	+15～+40 ℃
	Humidity range	55～85 %RH
	Temperature and humidity fluctuation range	± 1℃ / ± 7 %RH
	Light intensity	2～50,000 lx (under 1m from the light)
	Wind velocity	Below 0.5 m/s (0.5 m on the floor)
Structure	Exterior	Color steel or PVC steel
	Interior	Stainless steel or color steel
	Insulation material	Hard urethane foam
Air conditioner	Refrigeration method	Single stage refrigerating (air cooling)
	Heating method	Heater
	Humidification method	Humidifier
Light source		HID lamps, fluorescent lamps
Power		AC200V 3 φ 50/60 Hz
Fittings		Cable port, ventilating system

※ CO_2 Control system is optional.

○ HID lamps

TAB (incubation room)

- TAB is a thermostatic chamber which type of prefab can use as incubation room.
- Air conditioning unit is selectable from ceiling location to stationary.
- We can also offer clean specification equipped HEPA filter.

○ Fluorescent lamp

○ CCFL

	Model	TAB
Performance	Temperature range	+15～+35 ℃
	Humidity range	No control
Structure	Exterior	Color steel or PVC steel
	Insulation materia	Hard urethane foam
Air conditioning	Refrigeration method	Single stage refrigerating (air cooling)
	Heating method	Heater
	Humidification method	Humidifier
Light source		Selectable from fluorescent lamp, CCFL LED, etc.
Power		AC200V 3 φ 50/60 Hz
Fittings		Nursery shelf, observation window, cable holes, ventilation system, room lamp, outlet

Standard dimension (TAB・TAT・TAD・TAR in common)

Model	Interior (W × D × H ㎜)	Floor area
Type	1700 × 1700 × 2000	2.9 ㎡
Type 5	2600 × 1700 × 2000	4.5 ㎡
Type 6	3500 × 1700 × 2000	6.0 ㎡
Type 9	3500 × 2600 × 2000	9.1 ㎡
Type 1 2	3500 × 3500 × 2000	12.3 ㎡
Type 15	4400 × 3500 × 2000	15.4 ㎡
Type 18	5300 × 3500 × 2000	18.6 ㎡

Artificial light use

Assembled type constant temperature and humidity chamber (Low temperature / low humidity chamber)

TAT (Assembled type constant temperature and humidity chamber)

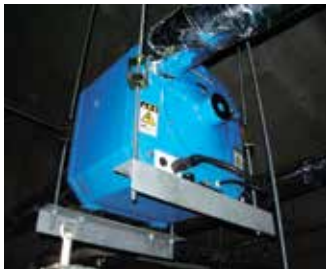
- TAT is a constant temperature room of a panel assembling type.
- TAT can control temperature from -10 ℃ to +60 ℃ as standard. There is also customized type can control temperature from -40 ℃ to +80 ℃ .
- Humidity range can also control from 40 % to 90 %.
- Air conditioning unit adopts the blowing system from the wall.There is also available blowing from the ceiling or floor as optional.
- In the instrumentation unit, you can choose constant value operation and program operation.

Model		TAT
Performance	Temprature range	-10～+60 ℃ (-40～+80℃ of range is possible as option)
	Humidity range	40～90 %RH
Structure	Exterior	Color steel or PVC steel
	Insulation material	Hard urethane foam
Air conditioner	Refrigeration method	Single stage refrigerating (air cooling)
	Heating method	Heater
	Humidification method	Heater / humidifier
Power		AC200V　3 φ　50/60 Hz
Fittings		Room right, Outlet

TAD (Low humidity chamber / seed vault)

- TAD is a low temperature and low humidity room suitable for seed preservation.
- TAD can reproduce the low humidity environm ent of 20 % relative humidity because of dry type of dehumidifier.

Model		TAD
Performance	Temperature range	+5～+20 ℃
	Humidity range	20～50 %RH
Structure	Exterior	Color steel
	Insulation material	Hard urethane foam
Air conditioner	Refrigeration method	Single stage refrigerating (air cooling)
	Heating method	Heater
	Humidification method	Dry type dehumidifier
Power		AC200V　3 φ　50/60 Hz



○ Dehumidifier

TAR (Low temperature chamber)

- TAR is a low temperature room of panel assembling type which is used for preservation of medical product and low-temperature experiment.
- In air conditioning unit, there are air conditioner and separation of outdoor unit as standard.
- Refrigeration specification is up to -20 ℃ is possible.

Model		TAR
Performance and temperature range		+2～+20 ℃
Control method		ON-OFF control
Sturucture	Exterior	Color steel
	Insulation material	Hard urethane foam
	Door	Insulation door　W850 × H1800 ㎜
Air conditioning	Type	Indoor ceiling suspension type
	Refrigerator	Single stage refrigerating (air cooling)
	Defrost	Heater
Power		AC200V　3 φ　50/60 Hz

○ Example of installation

Peripheral materials and equipments

Cultivation equipment

TNR (Illuminated nursery shelf)

- TNR is an optimal illuminated nursery shelf for plant germination, nursery and incubation.
- Three-wavelength light-emitting fluorescent lamp is equipped as standard light source.It is also possible to increase light intensity and waterproo
- In addition to the fluorescent lamp, CCFL and LED are also prepared.
- Depending on the application, it is also available in various sizes.

○ Fluorescent lamp

○ CCFL

Model	TNR-900	TNR-1500
Body dimension	W910 × D460 × H1892	W1520 × D460 × H1892
Material	Chrome-plate, SUS430, aluminum, etc	
Number of stages	5stages (4 stages with lighting) withstand load:about 200kg/stage	
Lighting device	Three wavelength type fluorescent lamp	
Light intensity	20 W × 8set (2 set / stage)	40W × 8set (2 set / stage)
Control board	1 set (24hr timer, 15 min intervals)	
Power	AC100 V, single phase 50/60 Hz	

Multistage cultivation system

- It is a multistage type cultivation shelf for effective use of space in plant factory for leafy vegetable.

Cultivation shelf

- It is a flat type shelf for experiment in Phytotron, etc.

Moving bench

- It is a moving bench powered by conveying function for maximum use of cultivation space.
- Optionally, take out the bench arbitrarily and can also perform three-dimensional transportation.

Rolling bench

- It can use space effectively with moving benches from side to side

Spacing system (column type)

- It is a column type hydroponics system by flowing the nutrient solution on the column.
- It is equipped with conveying system which increases the space of column for plant growth.

Hanging gutter

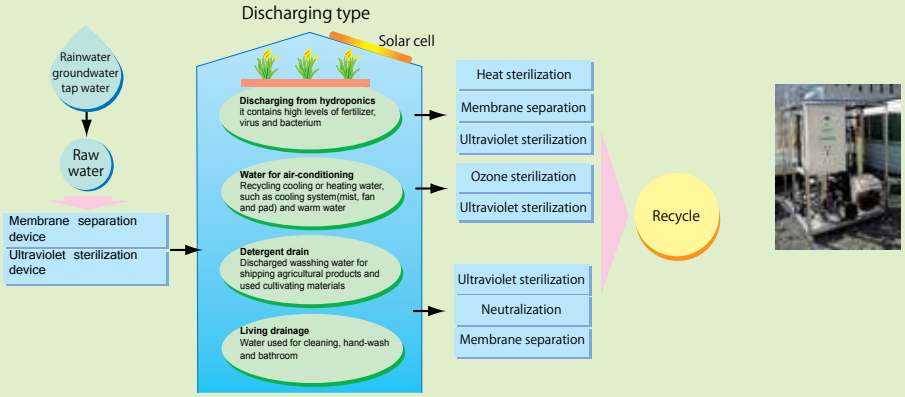
- It is a cultivation system hanging slab for nutrient culture used rock wool.

Water-treatment

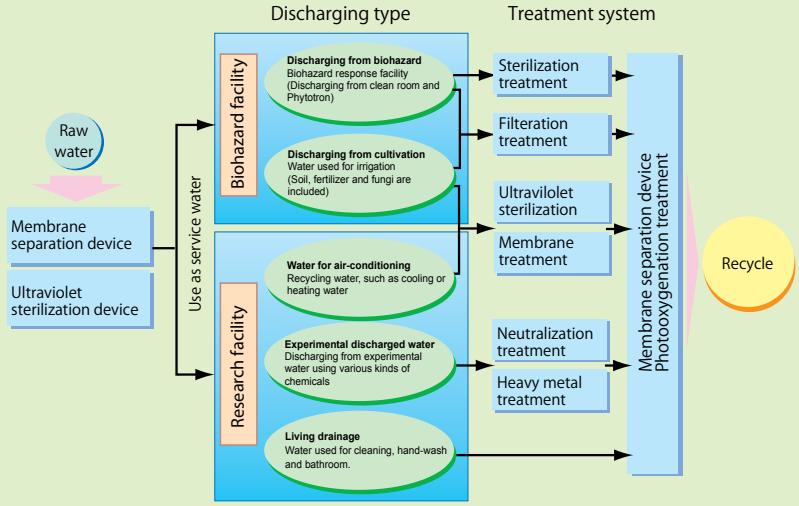
Water-treatment for agriculture and fisheries related facilities.

Water-treatment for plant production facilities

Reliable processing of disinfection and sterilization to prevent affect on ecosystem, is crucial for discharge of water, that are used in facilities such as disease, breeding, etc. in the agricultural sector. And in production facilities such as protected horticulture, there are much discharge of water into the environment. Therefore, processing and recycling of the discharged water is an important issue in conservation of environmental resources.

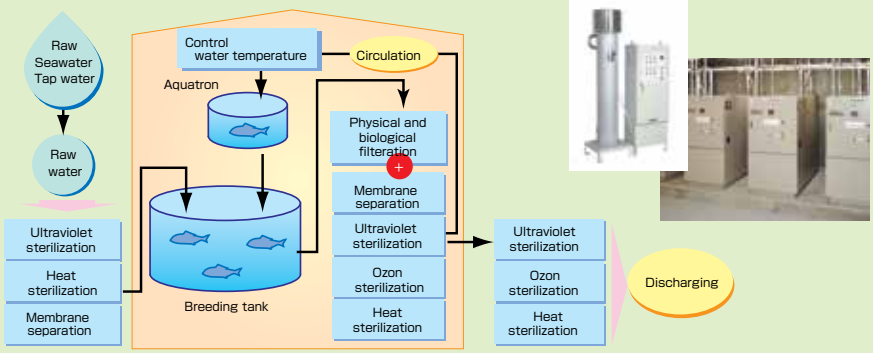


Water-treatment in plant research facilities



Water-treatment in aquaculture facilities

In the same as with the agricultural sector, reliable processing of disinfection and sterilization to prevent affect on ecosystem is crucial for discharge of water, that are used in facilities such as seedling production, disease experiment, etc. For research on recycling system of water and wastewater in aquaculture facilities on land, advanced water-treatment technology is required.



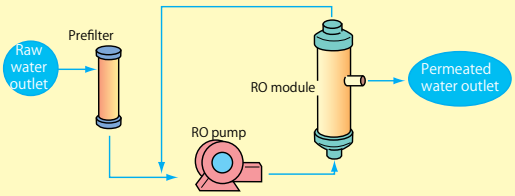
Water treatmet

Row water and water treatment equipment

RO membrane water treatment equipment (Reverse osmosis membrane) RO

It is a water-treatment equipment used reverse osmosis membrane (RO membrane). You can use for advanced water-treatment such as demineralization, clarifying and sterilization of ground and seawater.

- It is a unitized compactly, and it is needed less installation space.
- Combination of UF membrane as preprocessing extends life of the RO membrane.



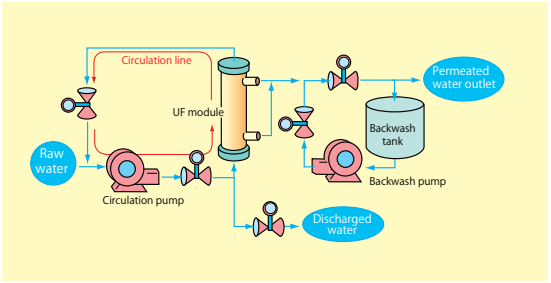
Model			RO-20A	RO-35A	RO-50A	RO-75A	RO-100A
Power			AC100V 50/60 Hz				
Water source			tap and city water, and chlorinated industrial water (0.1 ~ 0.3 MPa)				
Raw water condition			Electrical conductivity : below 300 μs/cm Water temperature : 5 ~ 45 ℃				
Ambient temperature			5 ~ 40 ℃				
Performance ※1	Water production (ℓ/hr)	Water temp. 25 ℃	20	35	80	120	160
		Water temp. 15 ℃	14	24	56	84	112
		Water temp. 55 ℃	8	14	32	48	64
	Salt rejection		over 96%				
RO membrane			Wholly aromatic polyamide system compound membrane				
Number of RO membrane			75GPD × 1	75GPD × 2	150GPD × 2	150GPD × 3	150GPD × 4
Exterior dimension (mm)			W455 × D250 × H770				
Weight (kg)			23	24	45	46	47

※ 1 for 0.3 MPa of primary water pressure

UF membrane water-treatment equipment (ultrafiltration membrane) UF

It is a water-treatment equipment used ultrafiltration membrane (UFmembrane). It produces the effect on sterilization and clarifying any water such as nutrient solution for hydroponics, well water, industrial water, river water and seawater.

- UF membrane removes turbidity, bacteria and viruses.
- It is a unitized compactly.
- It is possible to automatic operation
- It is possible to stable operation for long periods by automatic backwashing function.
- Depending on the application, it is possible to manufacture from small to large capacity (Please contact us for more information).



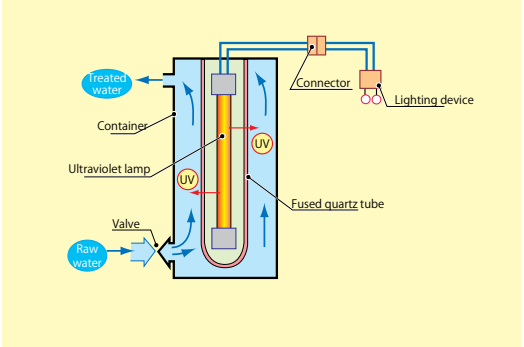
Model		UF-1	UF-2	UF-3
Power		AC100 50/60 Hz		
Raw water condition		Water temperature:5 ~ 35 ℃ , Water pressure:0.1 ~ 0.25 MPa, pH:4 ~ 10		
Ambient temperature		5 ~ 45 ℃		
Performanc	Standard permeate flow rate (m³/h)	0.5	1.0	2.0
	Pressure (MPa)	0.1		
	Water temparture (℃)	25		
extra filteration film		Polypropylene film		
Number of module		1	1	2

Water flow type UV sterilizer equipment UV

Our water flow type UV sterilization equipment radiates wavelength 254.7 nm of UV, and it kills bacteria, mold and algae which are suspending in the flowing water.

- It is internal radiation type, which protect UV lamp by a silica glass tube. Therefore, it can increase sterilizing effect because radiated UV light is used for sterilization without waste.
- Depending on the application, it can be manufactured from 100 liter/h to 50m3/h (please contact us for more information).

○ Examples of use



Water treatmet

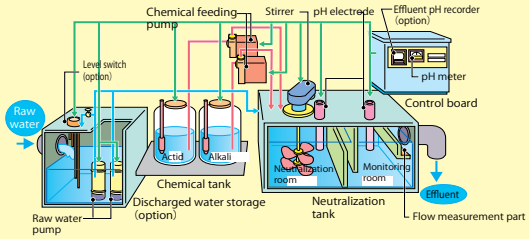
Neutralization treatment equipment

pH neutralization equipment — TApH

Discharged water neutralization treatment device is for that it neutralizes and discharges pH of strong alkaline or strong acid water exhausted from construction sites, research facilities, hospitals and various factories.

- It is a unitized compactly, and it is needed less installation space because it is divided into units of neutralizing control and chemical liquid.
- You can choose manual or automatic operation mode.
- You can choose the device depending on amount of wastewater and size of facilities.
- Effluent pH abnormal alarm function, which alerts and stops the device when pH value of effluent exceeds the range of pH 5.8 to 8.6, is included as standard.
- It can be installed anywhere because it is for outdoor.

■ Treatment process flowsheet



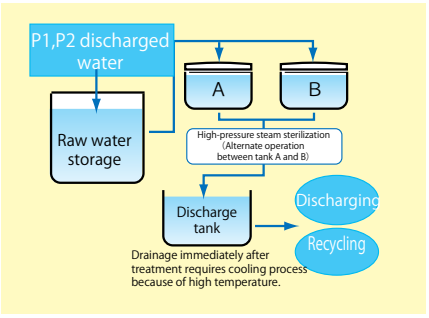
Moel	TApH-1	TApH-3	TApH-5	TApH-10
Processing capacity	1 ㎥/h	3 ㎥/h	5 ㎥/h	13 ㎥/h
Amounto of neutralization tank	200 ℓ	600 ℓ	1000 ℓ	2500 ℓ
Chemical tank	200 ℓ	200 ℓ	200 ℓ	200 ℓ
Processing object	pH of actid or alkaline discharge			
Option	Raw water pump, large and small chemical tank(100 ℓ ,750 ℓ) pH recorder, cradle, etc.			

※ Chemical is not included. it is required separately.

Effluent-high-pressure steam sterilizer — TAO

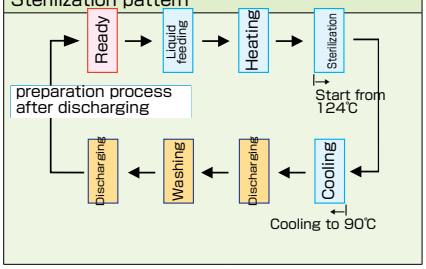
This equipment is sterilizer of contaminated wastewater with high temperature and pressure.

- We offer as an automated process system, such as from supplying effluent into treatment container to sterilizing and cooling water discharge after sterilizing.
- We used stainless (SIS316) for treatment container body, and consequently you can use it with confidence for long periods. And, it is also possible to make titanium body for seawater and pH unstable effluent.
- Treatment capacity can be changed depending on customer' s applications such as from small size of 20 liter to large size of 500 liter.
- Principal use
  - · Sterilization of wastewater from biohazard facilities (such as genetic modified organism, etc.) and medical facilities.
  - · Treatment of wastewater which includes pathogens and cells of animal and plant.
  - · Treatment of various wastewater from food, medical facilities, etc.



● Sterilization

Sterilizing temperature	120 ℃
Regular working pressure	1.1 ～ 1.5 kg/㎠G
Sterilization pattern	



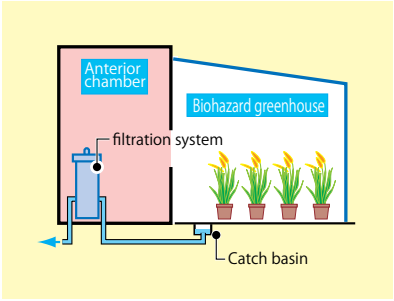
● Main unit size of standard container

small pressure container	First-class pressure container	
20 ℓ	100 ℓ	750 ℓ
30 ℓ	200 ℓ	1000 ℓ
50 ℓ	300 ℓ	2000 ℓ
90 ℓ	500 ℓ	3000 ℓ
		5000 ℓ

※ All this equipment will be customized. Please contact us for specification, price, etc.

Filtration system

You can use filtration system for wastewater treatment from biohazard system in P1P level.



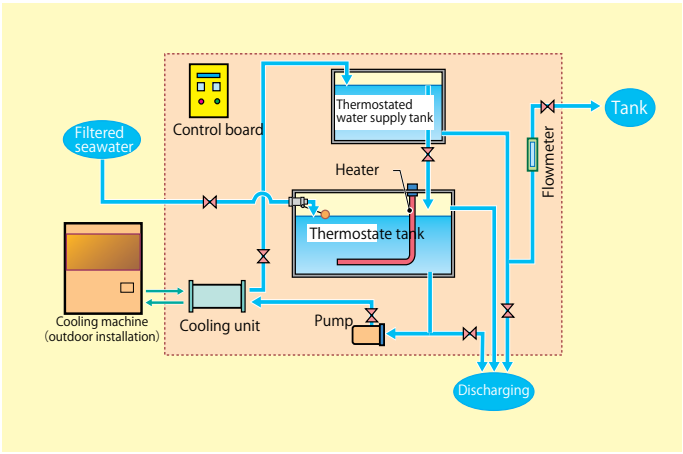
Water treatmet

Aquatron

Aquatron (water temperature control device) TAQ

Aquatron is a water temperature control device in experiment and research facilities of seedling and disease of fish and shellfish, and aquaculture facilities on land.

- It is possible to control water temperature with high accuracy from low to high water temperature by our temperature control technology which is cultivated in environmental control field.
- It is a unitized compactly, and it is needed less installation space.
- Depending on amount of water treatment capacity, we can offer various types of systems from small to large capacity.
- It is also preparable an aquaculture system which is combined with water tank and filtration.



○ Outdoor installation type

Model	All-in-one thermostatic tank unit
Capacity	0.5 ㎥/h
Range of temperature control	+15～+25℃ ± 1.0 ℃
Thermostatic tank	200 ℓ × 1 unit
Thermostated water supply tank	100 ℓ × 1 unit
Circultation pump	0.4 KW (about200 ℓ /㎜)
Unit size	W2600 × D1200 × H2000 ㎜

The above is an example. Please contact us for more information.

Algae culture system TBKO

It is a suitable system for cultivation of microalgae such as chlorella and nannochloropsis.

- There are two kinds of systems. Oval type cultivation system is lighted with fluorescent lamp from the side, circular type cultivation system is lighted with metal halide lamp from top.
- Stirring can work stably by supplying air from the bottom.

Model	TBKO-1A (Oval type)	TBKO-1B (Circle type)
Volume of water	1000 ℓ	
Tank	Acrylic	Polycarbonate
Water temperature control	+10～+25 ℃	
Light quantum	above 200 μ mol m^{-2} s^{-1}	above 100 μ mol m^{-2} s^{-1}
Aeration	over 100 ℓ / min	

○ Oval type

○ Circle type

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