



『Plant Growing Chamber』 educational platform for Precision agriculture



I. Plant Growth Chamber: PGC-125PS

1. Introduction

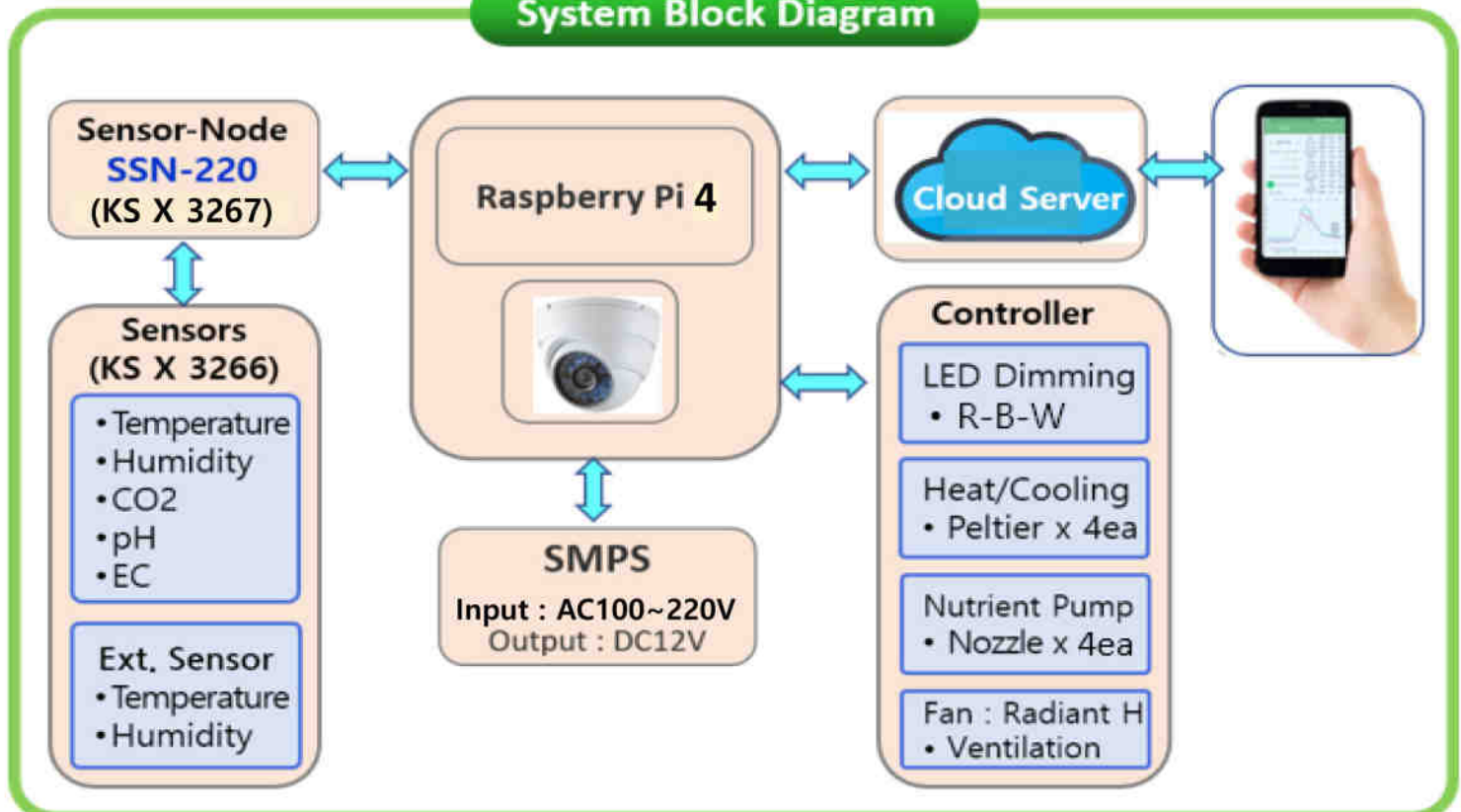
The main purpose of this product is to accelerate digital transformation in the field of botany and agriculture, and to learn technology and intelligent environmental control technology that derive optimal growth conditions for plants according to the plant growing environment. It is suitable for smart farm practice, such as the learner directly controlling the plant cultivation environment, preparing the composition of the nutrient solution, remote control and monitoring, group participation, remote guidance, cultivation diary, and storage of cultivation-control-image data..



Product	Plant Growth Chamber : PGC-125PC
Product weight	68 Kg
Size	562(W) x 555(D) x 944(H) mm
Power supply	AC100 ~ 220V, 60Hz
Power Consumption	300 W
Safety devices	Overtemperature overcurrent cut-off device (FUSE)

2. System Block Diagram

System Block Diagram





FarmsCube Smart-Farm Solution

I. Operation | Cultivation Environment Setting

Taking Pictures(RGB)

Take picture 2 times every day Take picture start time: 오전 06:00

SAVE (Save the modified control setting to the equipment)

ADD CONTROL LIST



Taking Pictures(RGB)

Take Picture 2 times every day Take picture time: AM 06:00

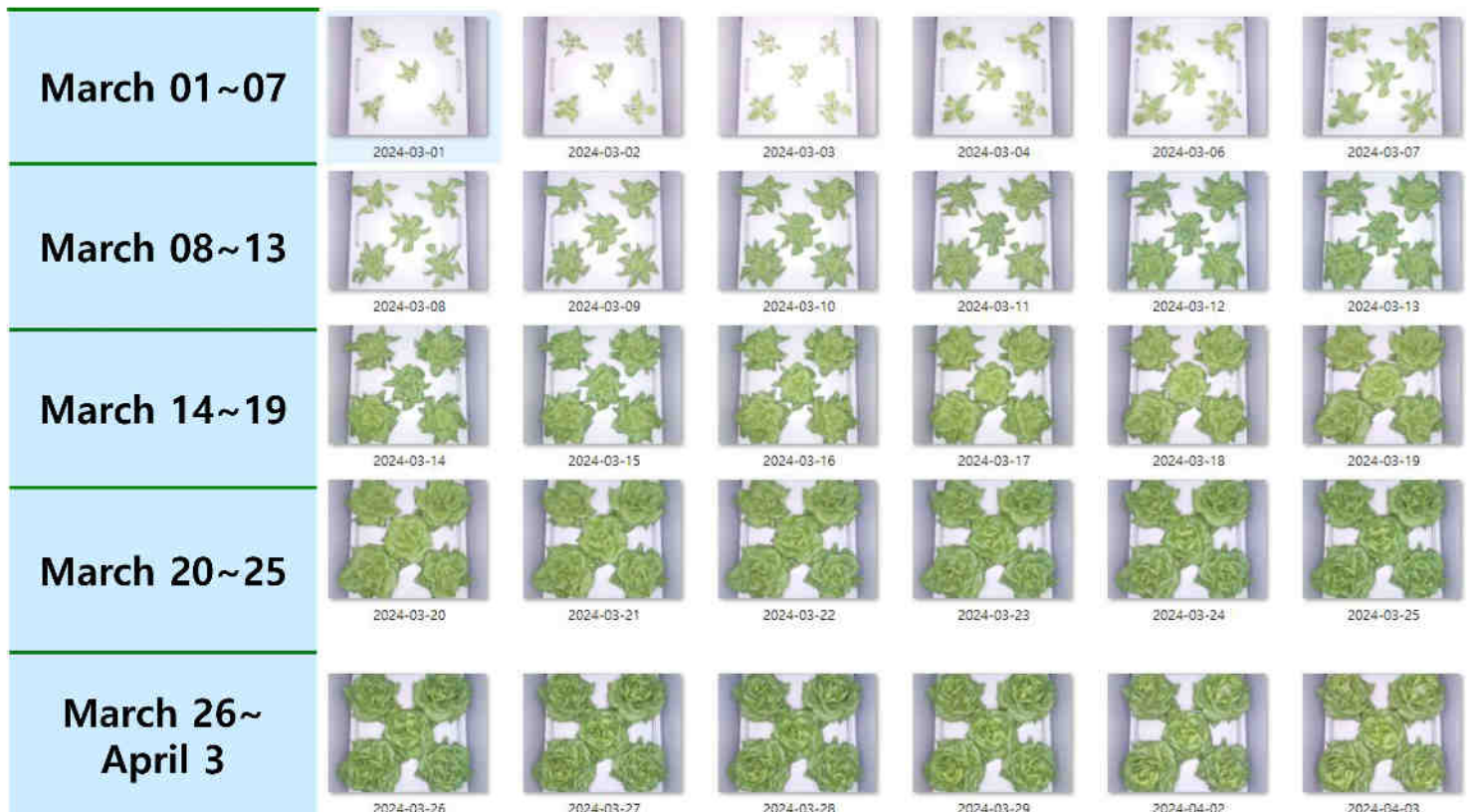
SAVE (Save the modified control setting to the equipment)

ADD CONTROL LIST



I. Operation | Crop Images

Cross-cultivate plants from the other contry





II. Plant Growth Chamber: SGC-250EC



- This product is an educational plant growth chamber for high school students, college students, and farmers in the field of agriculture to learn about vertical farming.
- Learners can mix the nutrient solution and control the optimal cultivation environment.
- It collects cultivation environment data, control data, and image data from multiple sensors, and includes all functions for cultivation practice.

Product	Edu.-Plant Growth Chamber (SGC-250EC)
Product weight	174 Kg
Size	• Exterior : 765(W) x 870(D) x 1537(H) mm • Inside : 600(W) x 520(D) x 790(H) mm
Power supply	AC220V - 60Hz, (AC110V : Available)
Power Consumption	1,760 W
Safety devices	Overtemperature overcurrent cut-off device

II. Plant Growth Chamber: SGC-250EC

Specification

- Product Name : Educational Plant Cultivation Chamber
- Model : SGC-250EC
- Sensors : Temperature • Humidity • CO2 • pH • EC • Weight • Water level
- Camera : 2M pixel
- Electronic balance : Daily raw weight measurement, 0~30 Kg
- Temperature control : Temperature (cooling/heating), 10~35℃
- Light quantity control : LED (RED-BLUE-WHITE), diming : 0~100%
- Nutrient solution supply : Drip type, NFT, Sprayer (supply of 3 types of cultivation groups)
- Control device : 10" TP, Raspberry Pi-4, OS: Linux
- Cultivation quantity : Number of cultivation beds (1 layer), Number of cultivation pots (6 plants : standard)
- National standard : Apply KS X to sensor • actuator • communication protocol
- Size : Exterior (W765 x D870 x H1430), cultivation (W600xD520xH790)
- Power: AC220V, 10A, 60Hz
- User Manual :



FarmsCube Smart-Farm Solution

II. AI Cultivation research : PGC-125PC & SGC-250EC

On-site photos (Hwasun Campus)



Bok choy cultivation & Lettuce cultivation

III. Operation | Cultivation Environment Setting

Temperature control

Automatic control list.

Temperature Control (PID) ☒ Enable auto control [Change setting ^](#)

During the day(08:00~18:00), the internal temperature is kept at **20 °C**

During the night, the internal temperature is kept at **13 °C**

※ 배양 온도 프로그램 관리하기 ☒ Advanced setting

Set to daytime 오전 08:00 ~ 오후 08:00

P **3.3**

I **0.03**

D **2.1**

[SAVE](#) Save the modified control settings to the equipment.

LED Control (3 Color)

☒ Enable auto control [Change setting ^](#)

During the day(08:00~21:20), turn the LED light on to **100 %** brightness.

※ Adjust the brightness of the LED by color.

☒ Advanced setting

Set to daytime **AM 08:00 ~ PM 09:30**

White **100 %**

Red **100 %**

Blue **100 %**

[SAVE](#) Save the modified control settings to the equipment.

Water Supply(Timer)

☒ Enable auto control [Change settings ^](#)

During the day(08:00~20:00), water is supplied every **30 min** for **120 sec**

During the night, water is supplied every **60 min** for **120 sec**

※ Water is provided at regular intervals ☒ Advanced setting

Set to daytime 오전 08:00 ~ 오후 08:00

[SAVE](#) Save the modified control settings to the equipment.

Air Circulation

☒ Enable auto control [Change settings ^](#)

Operate the ventilation fan, valve when the internal CO₂ concentration is less than **350 ppm**

or humidity is greater than **85 %**

※ It circulates outside air to lower humidity and CO₂ concentration ☒ Advanced setting

Set to operating time 오전 08:00 ~ 오후 06:00

Turn on time **600 sec**

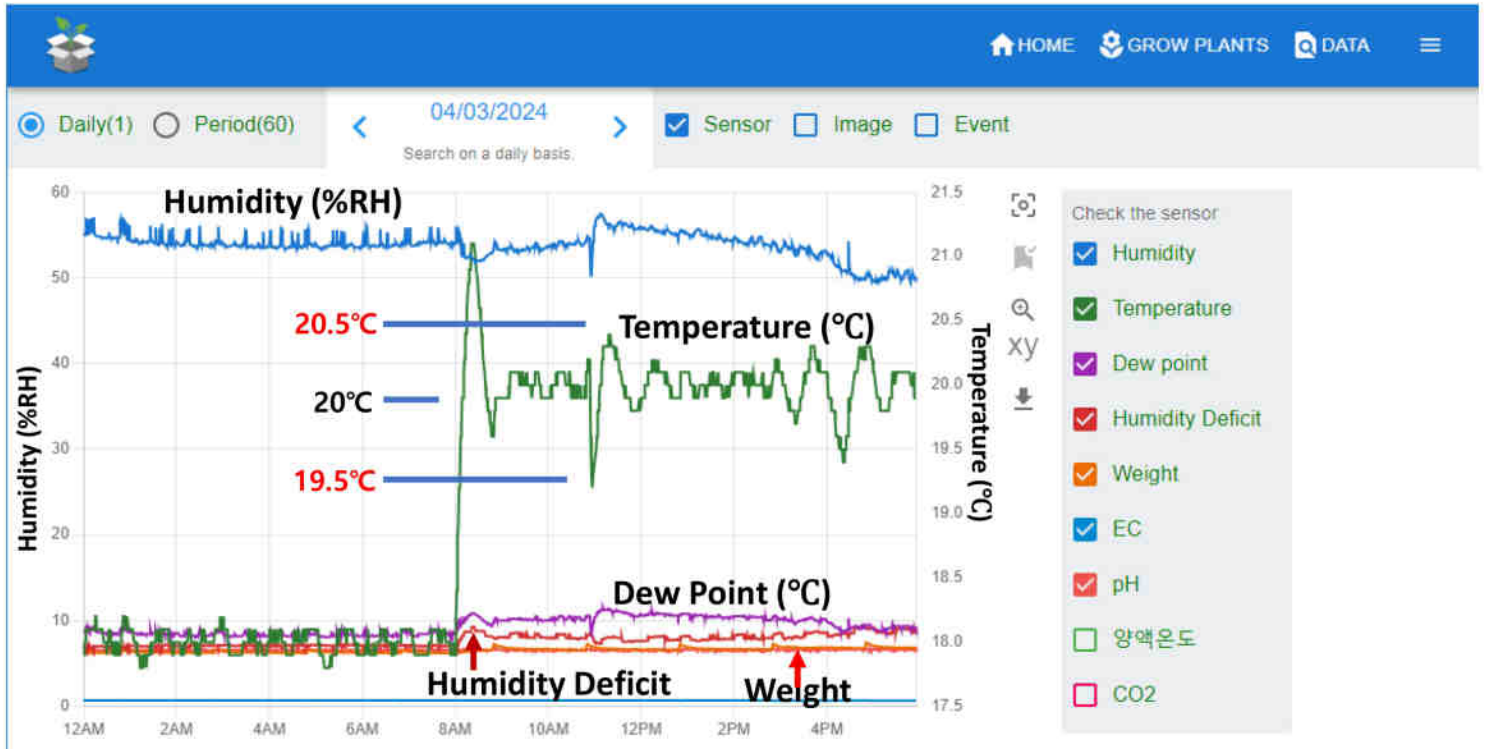
Turn off time **600 sec**



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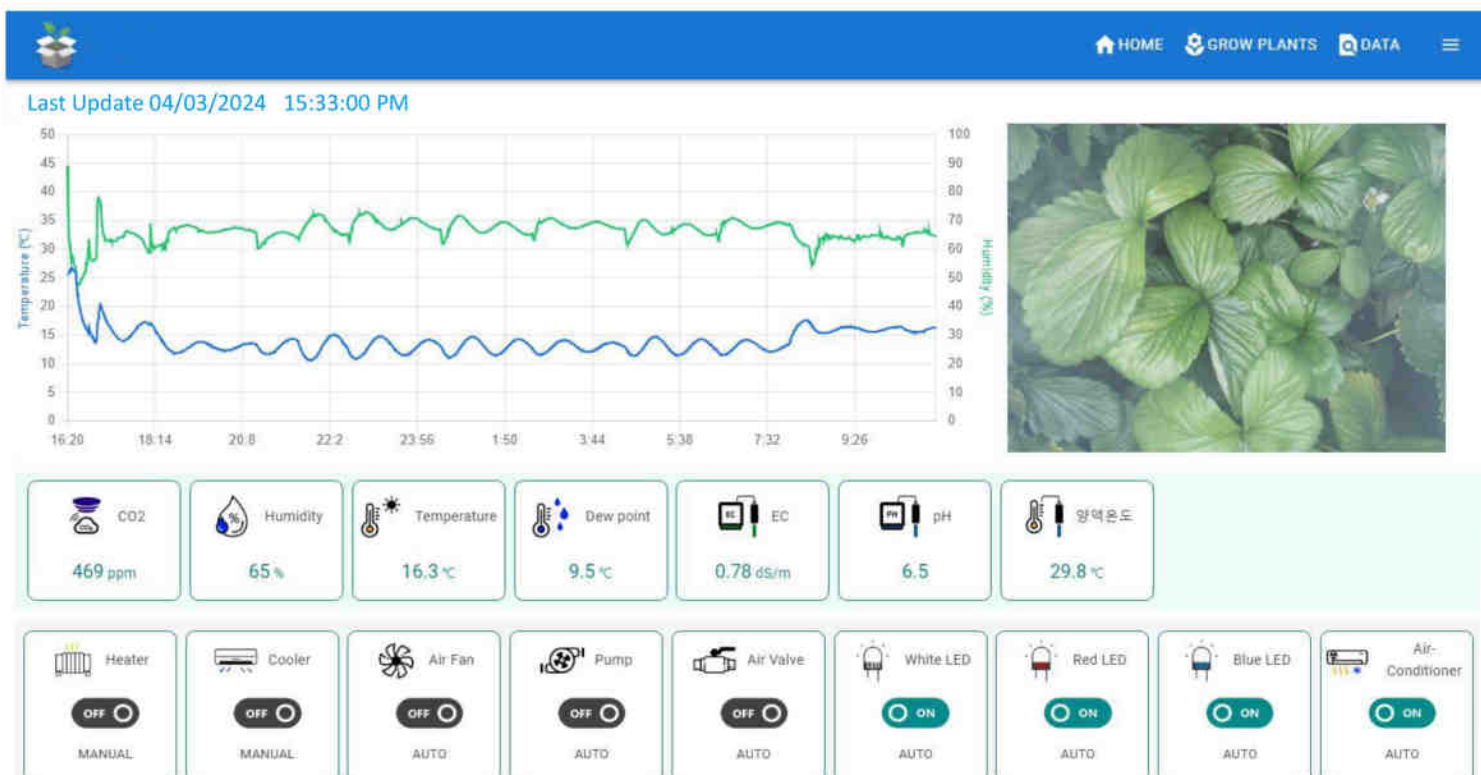
III. Operation | Cultivation Environment Data

2024. April 3, 00:00~18:00



III. Operation | Cultivation Environment Data

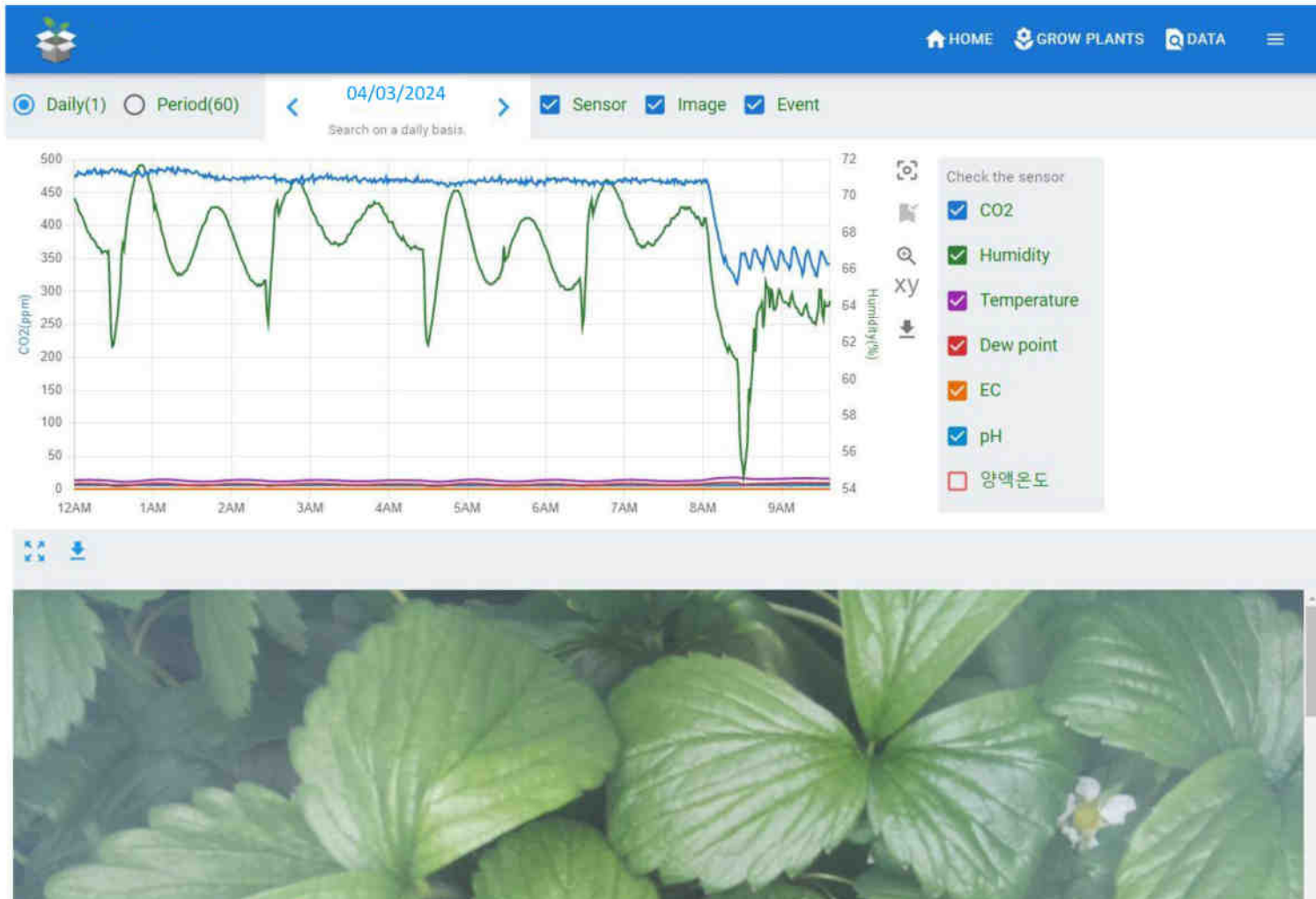
Cross-cultivate plants from the other country





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III. Operation | Cultivation Environment Data





FarmsCube Smart-Farm Solution

IV. Mini Greenhouse : SMG-1200W



- This product is designed so that students can directly operate the entire process of plant cultivation by installing a smart farm mini greenhouse in an agricultural educational institution.
- The sensor, sensor node, integrated controller and operation software used in this product have improved the effectiveness of practice already by applying products used in the actual field.

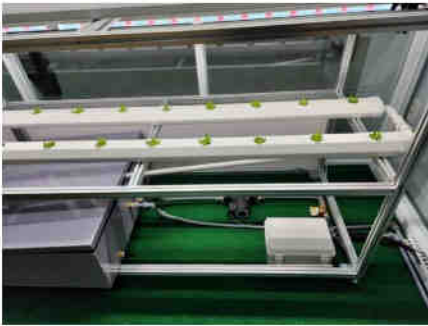
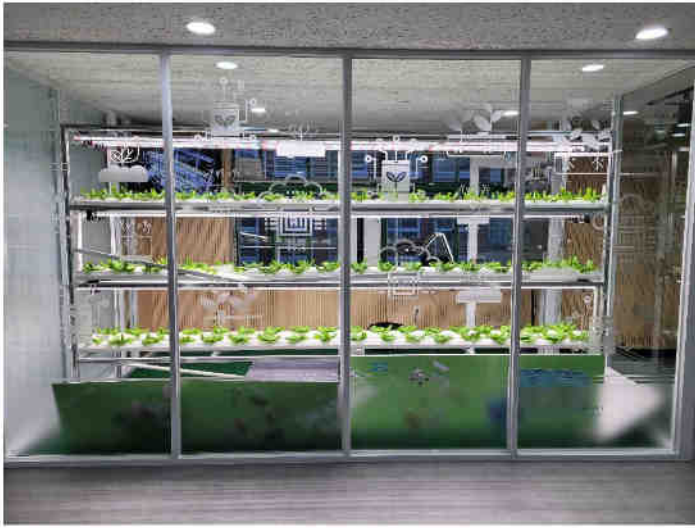
Product (model)	Mini Greenhouse (SMG-1200W)
Cultivation Gutters	Single Inline Gutter x 3 line
Nutrient solution supply	NFT(Nutrient solution supply method)
Controller	SFC-2800M
Weather Sensors	Basic use (included in the box)
External Size	1,200(W) x 800(L) x 1,100(H1) x 1,940(H2)
Power supply	AC220V - 60Hz, (AC110V : Available)
Power Consumption	1,200 W
Safety devices	Overtemperature overcurrent cut-off device

IV. On-site installation cases | Gyeonggi Agriculture High School

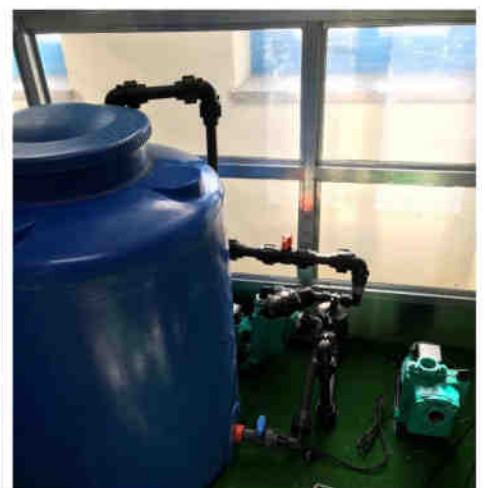




FarmsCube Smart-Farm Solution



IV. On-site installation cases | Changwon Agriculture High School





FarmsCube Smart-Farm Solution



V. Edu-Plant Grower: SPS-2100/1800D/1500D/1200D

- This product is an educational plant grower designed to help high school and college students in the field of agriculture, as well as farmers, systematically learn everything from the basics of vertical farming to advanced techniques.
- This product features a small-scale nutrient solution recirculator, allowing for the control of the optimal cultivation environment.
- It collects cultivation environment data, control data, and image data from multiple sensors, and includes all functions for cultivation practice.



Product (model)	Edu-Plant Grower (SPS-2100D/1800D)
Size (Exterior)	• SPS-2100D : 2100(W) x 870(D) x 2000(H) mm • SPS-1800D : 1800(W) x 870(D) x 2000(H) mm
Controller	VFC-2600D (Relay : 12 CH)
Cultivation Gutters	Double Inline Gutter x 2 line
Nutrient solution supply	• NFT(Nutrient solution supply method) • Nutrient solution level adjustable
Power supply	AC220V - 60Hz, (AC110V : Available)
Safety devices	Overtemperature overcurrent cut-off device

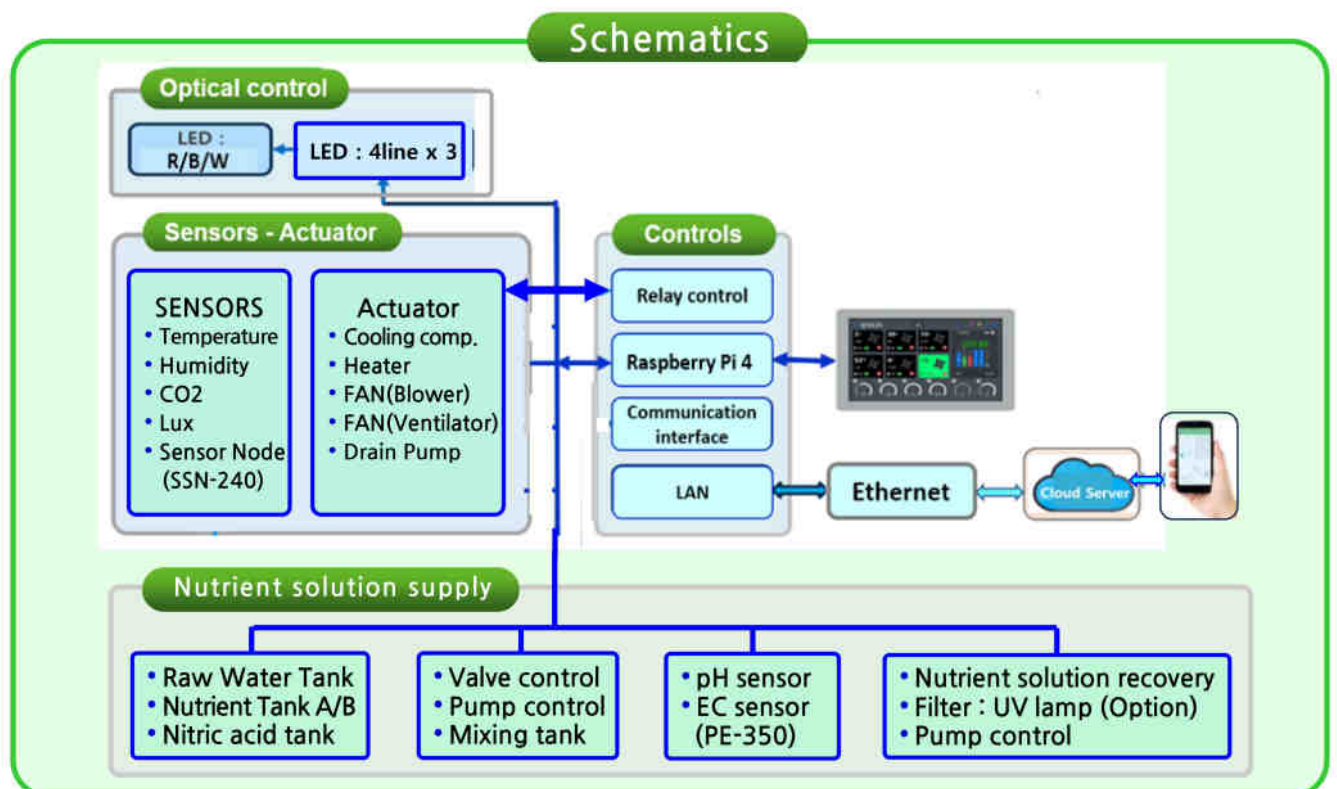


FarmsCube Smart-Farm Solution

V. Edu-Plant Grower: SPS-2100/1800D/1500D/1200D



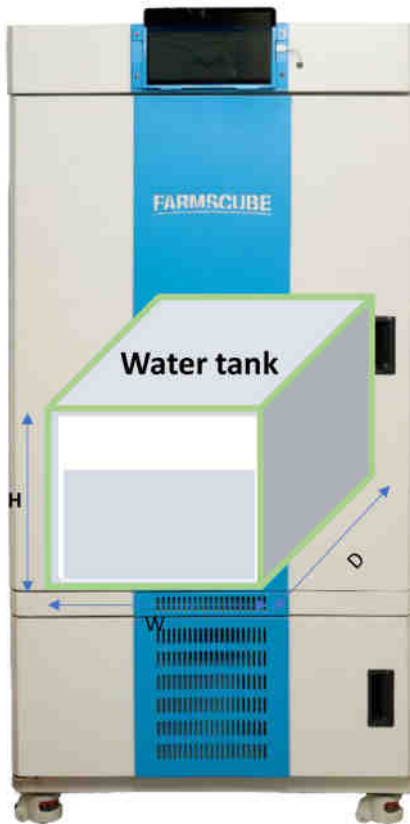
V. Edu-Plant Grower: SPS-1800D/1500D/1200D





FarmsCube Smart-Farm Solution

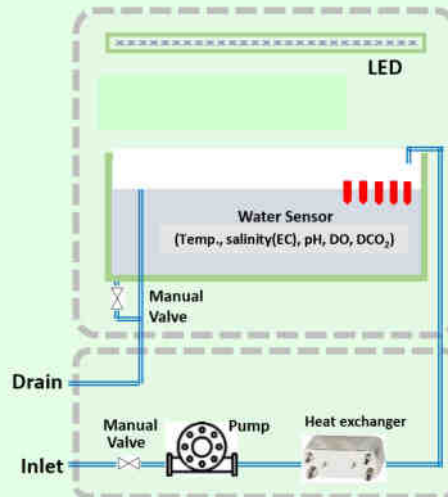
VI. Edu-Hawali Limu Seaweed Aquaculture Chamber



NATIONAL SCIENCE FOUNDATION 2024-26

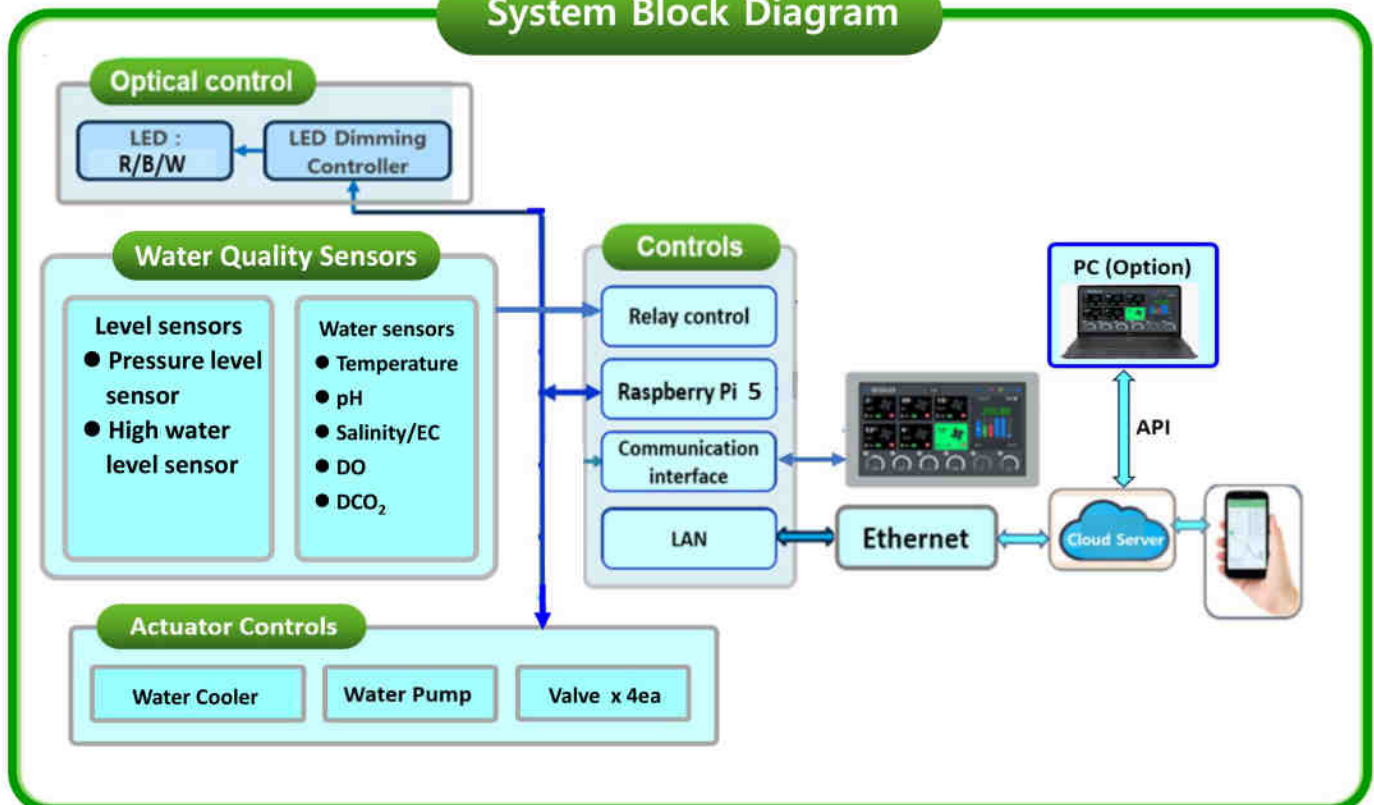
Growing limu in a controlled growing environment and collect data.
Castle High, WCC, HIMB, and Pacific American Foundation.

Seaweed Aquaculture Chamber



VI. Hawaii Limu Chamber Block diagram

System Block Diagram





FarmsCube Smart-Farm Solution

VI. Climate Change Lab at Seoul National University of A&F

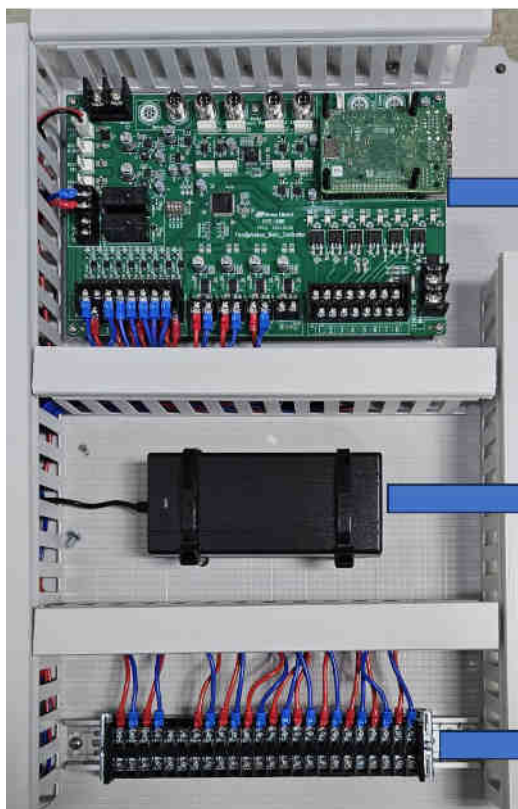
Seoul National University
University of Agriculture
Agriculture & Fisheries

Climate Change Lab

HMW grow a new generation generation of farmers who who can lead HI into a more more resilient future by weaving ancient and modern modern ways



VII. New Product Introduction: Integrated Control System



Integrated Control System

Motherboard : Applied Products



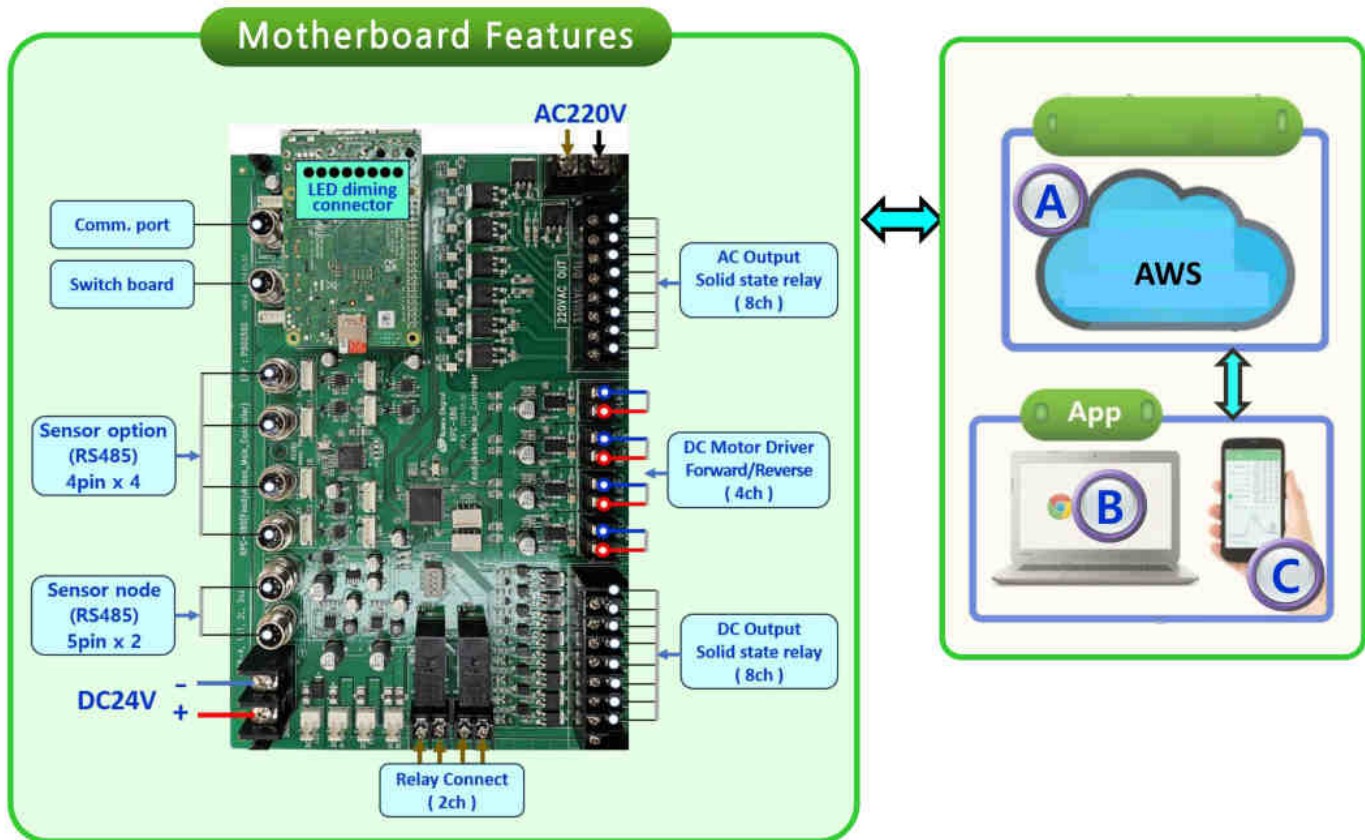
SMPS POWER SUPPLY

- Input Power : 100V ~ 240V, Free Voltage
- Output Power : DC24V, 00A
- Depending on the product, the current capacity varies.

TERMINAL

- Assign terminal numbers according to the product.

VII. New Product Introduction: System configuratuins



Appendix | 1 PGC -125PC-Specifications

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Plant Growth Chamber : PGC-125PC

The primary purpose of this product is to determine the optimal growth conditions for plants based on the plant cultivation environment in the fields of botany and agriculture, and to learn complex environmental control technologies. It is suitable for smart farm practices, enabling learners to directly control the plant cultivation environment, mix nutrient solutions in the correct proportions, and participate in remote control and monitoring, group participation, remote guidance, cultivation diary keeping, and the storage of cultivation-control-image data.

Who is practice target for Smart Farm

School (agricultural high school students-college students/science aspirants) • Agricultural Technology Center (for education of farmers)

Cultivator-Internal cultivation environment-App

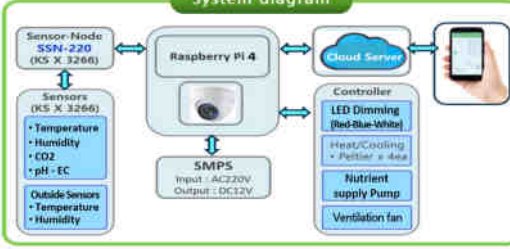


2x2 Special Event: Cooperative Learning Project through Smart Farm Cultivation

- Please purchase 2 units. Each unit will be used for remote cultivation with a school that also has two units.
- Designated School Selection and Criteria: Selected by the school where the product was purchased. (Internet access is required for this user.)
- International Collaboration through FARMSCUBE Server: Support for future overseas remote cultivation learning and international exchange learning at the student level.

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System diagram



Specification

- Product name : (For practice) Plant growth control room
- Model : PGC-125PC, (Plant Growth Chamber)
- Sensors(Inside) : Temperature • Humidity • CO2 • pH • EC • Camera (2M)
- Sensors(Outside) : Temperature • Humidity
- Temperature control : automatic temperature control function using Peltier elements (cooling-heating)
- Light quantity control : LED(RED-BLUE-WHITE) • Control : 0~100% Dimming,
- Ventilation control: Fan operation to circulate indoor air when CO2 is insufficient
- Nutrient solution supply method (three types of cultivation) :
 - NFT (thin film type), spray-type irrigation, drip-type irrigation
- Cultivation-port: Installation of the number of pots for cultivation (4 plants)
- Controller : Raspberry Pi-4, OS : Linux
- Size: W563 x D597 x H884 mm
- Growing bed size : W480 x D500 x H525 mm
- Power : AC220V, 5A, 60Hz
- Accessories : Seeds, nursery box, sponge medium, nutrient solution
- (A, B, C), 3 types of cultivation bed set
- User manual :

Remark

This product is a 'plant cultivation system' jointly researched by ^TKorea Institute of Science and Technology (KIST) • Korea Digital Co., Ltd. • FARMOSJ. The 'Food Jukebox' was developed by Korea Digital Co., Ltd. to allow learners to practice plant cultivation.



FarmsCube Smart-Farm Solution

Appendix | 2 PGC -250EC-Specifications

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Edu-Plant Growth Chamber

Korea Digital Co., Ltd.'s FarmsCube division has launched an educational plant growth chamber (Edu-Growth Chamber) for the prior learning of vertical farms that agricultural high school students, university students, and farmers will encounter in the future. Learners directly control and learn everything from crop selection to the setting and operation of the hydroponic system, and the optimal cultivation environment. Professors (instructors) can remotely monitor cultivation data in real-time and provide consultation through server data.

Smart Farm Education Target
Agricultural educational institutions

Internal cultivation environment App

Edu-Plant Growth Chamber : 24 Set

Big Data Collection system

AI culture recipe research

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System Block Diagram

Specification

- Product Name : Educational Plant Cultivation Chamber
- Model : SGC-250EC
- Sensors : Temperature • Humidity • CO₂ • pH • EC • Weight • Water level
- Camera : 2M pixel
- Electronic balance : Daily raw weight measurement, 0~30 Kg
- Temperature control : Temperature (cooling/heating), 10~35℃
- Light quantity control : LED (RED-BLUE-WHITE), dimming : 0~100%
- Nutrient solution supply : Drip type, NFT, Sprayer (supply of 3 types of cultivation groups)
- Control device : 10" TP, Raspberry Pi-4, OS: Linux
- Cultivation quantity : Number of cultivation beds (1 layer), Number of cultivation pots (6 plants : standard)
- National standard : Apply KS X to sensor • actuator • communication protocol
- Size : Exterior (W765 x D870 x H1430), cultivation (W600xD520xH790)
- Power : AC220V, 10A, 60Hz
- User Manual :

Appendix | 3 SGC -1000RM-Specifications

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Plant Growth & Stress Chamber

The Smart Plant Growth and Stress Cultivation Chamber (SGC-1000RM) supports research on various cultivation recipes through the control of general growth environments and stress environments. Since the requirements for stress environment control in the field vary depending on the crops being cultivated and the extraction materials, modules can be replaced to add various functions. (For example, for nutrient solutions, the basic specification is a small general nutrient feeder, while the stress specification is a multi-channel type nutrient feeder - special specification.)

Model : SGC-1000RM

Smart plant cultivation for expert research (Plant Growth & Stress Chamber)

- Basic sensor mounting for growth environment control research
- Welcome to special specifications for stress growth environment control
- Highly reliable and good cost performance through direct design and manufacturing

FARMSCUBE®

Korea Digital Co., Ltd. FarmsCube builds a system that shares cultivation data by interlinking the programs of products for practice - education - experts - business. In fact, by standardizing the communication protocol between each product, R&D achievements and specific cultivation recipes for cultivated crops can be shared between products and applied to mass production.

Specification

SGC-1000RM

CAPACITY
Ext. 1,316(W) x 1,215(D) x 205,0(H)
Int. 1,400(W) x 800(D) x 1,200(H)
■ Hemp cultivation

SENSORS
Temp-Humi-CO₂-pH-EC
PAR-Weight-Flow-Leaf Temp

CAMERA
RGB2M : 1980 x 1630
Depth Camera : 1280*960

Cultivation Bed
One left and right each
Cropping type : NFT, Drip, Aeroponics

POWER
Input : AC220V, 60Hz

Light Source
LED : R-G-B-W, far Red
(Option : UVA-UVB)
Dimming : 0~100 %

Nutrient supply
Nutrient solution precision control

Temperature control
0 ~ 50 ℃

Humidity control
20 ~ 90 %RH

Software
Cloud ready (Mobile, PC)
Remote Control/Cloud sharing
Automatic Control
Data Search/Download

Series for Research-Education-Practice

Research : SGC-1000RM Education : SGC-250EC Practice : PGC-523



FarmsCube Smart-Farm Solution

Appendix | 4 SSS -110/SFC-2400M-Specifications

FARMSCUBE®

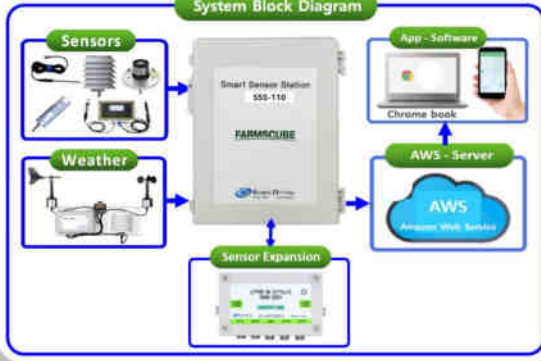
Smart Sensors(environmental) data collection system

This product is an IoT sensor data acquisition system suitable for measurement, analysis, and research in the field of ecological environment. The system comprises sensors specialized for air, soil, water, and smart agriculture, a data collection unit (model: SSS-110), and a power circuit. The SSS-110 unit, with its Plug and Play (PnP) feature, automatically recognizes all connected sensors, making installation and maintenance very easy. Whether using commercial wireless communication (LTE-Cat.M1) or the internet, all data is stored on Amazon Web Services (AWS) servers. The stored data can be downloaded using the API protocol. This product supports communication modules contracted by its users with telecommunications companies in their respective countries. Korea Digital provides sensors tailored to the needs of researchers.



- Product Name : Smart Sensor Station (Model Name: SSS-110)
- Sensors : temperature, humidity, soil moisture, solar radiation, CO₂-pH-EC wind direction, wind speed, rainfall detection, DO-O₂, etc., (other order specifications)
- Channel : 5ch, • Sensor Expansion : SSN-240, 4ch
- Communication : LTE-Modem or LTE-Cat.M1
- Server : AWS, API data provided, operated by Farmscube
- Features : KS X 3266 standard sensor, automatic recognition (PnP)
- Power : AC220V, 60Hz (Option : Battery)
- Detailed specifications : Please discuss at the time of product contract

System Block Diagram



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Smart farm complex environment control system
Model : SFC-2400M

The "Smart-Farm Complex Environment Control System" supplied in Korea is an "ICT Convergence • 1st Stage System," In the future, products focusing on productivity and cultivation quality will be released as "AI Convergence Type • 2nd Stage System."

Farmers who have adopted the complex environmental control system should now consider transitioning to the 2nd stage smart farm. This platform adheres to the KS X 3267 standard for communication between sensors, actuator interfaces, and integrated controllers. "FarmsCube" has designed all integrated controllers in such a way that, when transitioning from a 1st stage product to a 2nd stage product, only the "Main Unit" needs to be replaced, while the rest of the sensors and "Control PCBoard" remain compatible.

Product Specifications



- Product name : Open smart farm complex environment control system
- Model : SFC-2400M
- Sensor : Temperature • Humidity • Soil moisture • CO₂ • pH • EC
- Sensor : (outside air) Temperature • Humidity • Solar radiation • Wind direction • Wind speed • Rainfall detection
- Opening/closing : Side window left and right • Skylight screen (DC24V, ZKW-SMPS mounted)
- Control : Temperature (heating) • Nutrient supply • Ventilation • Ventilation • Fog-generation • Unmanned pest control
- Video : CCTV camera
- Touch panel : 10" TP, Raspberry Pi-4, OS: Linux
- Sensor standard : Complies with KS X 3266 interface standard
- Sensor node : Complies with KS X 3267 (RS485-Modbus) standard
- Actuator standard : Complies with KS X 3265 interface standard
- Water pump standard : KS X 3288 (RS485-Modbus)
- Size : 800(L) x 200(D) x 1400(H) mm
- Power : AC220V, 80A, 60Hz
- Detailed specifications : Please discuss at the time of product contract

Features of smart farm complex environment control system

- High compatibility among sensor, sensor node, and actuator products among system configurations by applying KS X standard.
- It is possible to directly control KS X 3288 standard type hydroponic pump (Ver.1~3 level) and to be compatible with standard hydroponic pumps.
- We provide AWS (Amazon Web Service) servers for free and support data agriculture
- Our smart sensors have been exported to Europe since 2006 and their accuracy and reliability are high.

Appendix | 5 Smart Sensor-Specifications

FARMSCUBE®

High-Precision, High-Reliability Smart Farm Sensor

- Our smart farm sensors are manufactured in compliance with KS standards: KS X 3266/3267
- PnP Feature: Easy A/S through unique sensor ID and automatic sensor recognition function.
- The smart farm sensors are directly manufactured by Korea Digital, undergoing precise calibration and exported to 40 countries.

Temp : KST-7150  • Range : -40~125 °C • Accuracy : ±0.25 °C	T - H : KSH-7310  • T : -40~85 °C, ±0.15°C • H : 0~100%RH, ±3%	CO₂ : KCD-HP100  • Range : 0~5000 ppm • Acc : ±(3%FS+2%R)	
pH-EC : pE-350  • pH : 0~14 • EC : 0~10 dS/m	DO : KDO-420  • Range : 0~50 mg/L • Accuracy : ±3 %	Soil Moisture : KSM-8900  • Range : 0~100 vol. • Accuracy : ±5 %	
Quantum : KPAR-850  • 0~2,000 μmol/m²s • wave : 400~700nm	Ammonia : KNH3-100  • Range : 0~100 ppm • Accuracy : ±5 %	Oxygen : KSF-O2-25  • Range : 0~25 % • Acc. : ±5% (Reading)	
Insolation SWSR-7500  • 0~2,000W/m² • ±5 %	Wind direction SWAP-7300  • 0~360° • 5% within	Wind speed SWS-7320  • 0~75 m/s • 5% within	Rainfall Sensor SWS-7481  • Signal : On/Off • Within 1 minute

FARMSCUBE®

Easy-to-use dedicated wireless sensor for smart farming

BLE connection • Rechargeable battery • Management of measurement data from smartphone

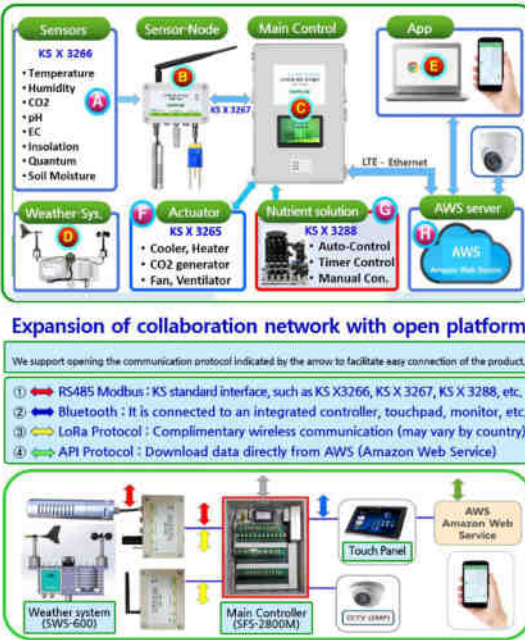
Temperature : WL-100T  • Measuring range : -40~125 °C • Resolution : 0.0625 °C	Temp.-Humi. : WL-117H  • Temp. Measuring range : -40~85 °C • Humidity Measuring range : 0~100%RH
CO₂ sensor : WL-111CO2  • Measuring range : 0~5,000 ppm • Resolution : 2.5 ppm	DO sensor : WL118DO  • Measuring range : 0~50 mg/L(Optical) • Resolution : 1 %
pH sensor : WL104pH  • Measuring range : 0~14(correctable) • Resolution : 0.01 pH	EC sensor : WL-107EC  • Measuring range : 0~20,000 dS/m • Resolution : 1 %

Appendix | 6 Control System-Specifications

FARMSCUBE®

Building an Ecosystem through a Digital Agriculture Platform

- The FarmsCube complex environment control platform opens its communication protocols for easy application by client companies.
- The operating program can be downloaded for free in its latest version, while the hardware is sold for a fee.
- Application areas include horticulture, vertical farming, open field cultivation, fruit cultivation, mushrooms, insect farming, marine bioculture, and more.



Expansion of collaboration network with open platform

We support opening the communication protocol indicated by the arrow to facilitate easy connection of the product.

- ① RS485 Modbus: KS standard interface, such as KS X3266, KS X3267, KS X3288, etc.
- ② Bluetooth: It is connected to an integrated controller, touchpad, monitor, etc.
- ③ LoRa Protocol: Complimentary wireless communication (may vary by country)
- ④ API Protocol: Download data directly from AWS (Amazon Web Service)

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Shared-use Smart Farm Weather System

LoRa communication-based meteorological equipment for shared use of smart farm weather observation data

Temperature-Humidity KSH-7310	Solar radiation SWSR-7500	Wind direction SWAP-7300	Wind speed SWWS-7320	Rainfall detection SWRS-7481
				
Shelter: KSH-7920				
• T: -40~85°C • H: 0~100%	• 0~2,000W/m ² • ± 5%	• 0~360° • 5% within	• 0~75 m/s • 5% within	• On-Off • 1min, within

Weather data broadcast

- One meteorological equipment for shared use.
- Reduction in facility investment and A/S costs.

SWS-600 Feature

- The world's first meteorological measurement data broadcasting function
- Data transmission every 2 minutes via LoRa communication
- Reduced burden on farms through shared use of weather equipment
- Installation of SSR-190 data receiver at farms
- Use of Meteorological Agency approved sensors for high accuracy and durability
- Real-time data storage on AWS (Amazon Web Service)
- Two-way digital communication
- Easy installation on-site: Shipped from the factory in a semi-assembled state
- Easy follow-up management: All sensors are connected with connectors
- Power: DC12V, (commercial power) adapter
- Solar panel: 30W or more, battery charging circuit, 5-day backup

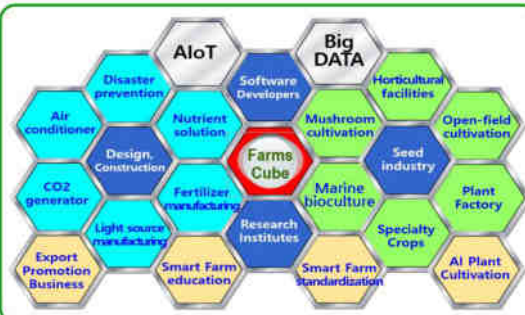
(Joint use within a radius of 1 km)

Appendix | 7 Introduction to Collaboration Networks

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Invitation to a collaborative chain network for mutual benefit.

- We aim to develop the FarmsCube Smart Farm Complex Environment Control Platform and jointly use it with contracted organizations.
- We are collaborating with companies, schools, and research institutions to advance digital agriculture, and we invite you to join us in this endeavor.



For the advancement of digital agriculture



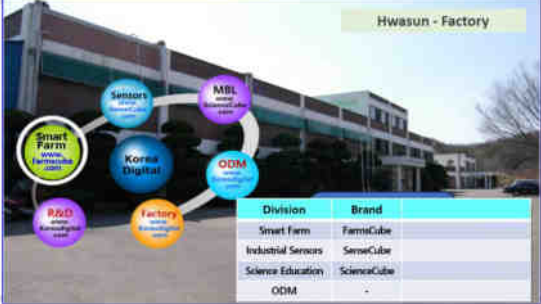
We run to wherever the customer asks us to go.
For the growth of the digital agricultural industry

FARMSCUBE®

Korea Digital Co., Ltd., : Exported to over 40 countries!



Exported to 40 countries



Hwasun - Factory



Division	Brand
Smart Farm	FarmsCube
Industrial Sensors	SenseCube
Science Education	ScienceCube
ODM	-



FarmsCube Smart-Farm Solution



FarmsCube Smart-Farm Solution



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