



**ALT Containerized (20/40-GP/HC) Customized
Planting Climate System
Leafy vegetables Factory Solution**

CHAPTER 1: Product and Delivery

1. Basic Parameters

Container Specifications: 20-foot standard/high cube container

(6058×2438×2438/6058×2438×2896)

40-foot standard/high cube container

(12192×2438×2438/12192×2438×2896)

Cultivation Modes: Three-in-one hybrid system combining hydroponics, aeroponics, and substrate cultivation.

Teaching Interface: Open PLC controller, Python/Arduino programming port.

Production Capacity Benchmark: Annual leafy vegetables output ranges from 5 to 15 tons per container of varying specifications. (Take lettuce as an example)

2. Customization Cycle

Standard Delivery (1 High Cube Container): 10-15 business days

Customized Delivery (1 High Cube Container): 15-25 business days

3. Delivery Process

Pre-sales consultation → Confirm customization requirements → Sign purchase agreement → Enter customization process → Functional verification and acceptance → Delivery and shipment → Training and instruction

4. Training Process

On-site Unified Training (3 working days): Structural Training, Basic Function Training, Production Training, Common Issues Training.

Remote Training (Available on all working days throughout the year): Structural Training, Basic Function Training, Production Training, Common Issues Training.

CHAPTER 2: Function and Structure

ALT Containerized Customized Cultivation Climate System comprises 6 major modules:

Cultivation Structure Module, Photosynthesis Module, Intelligent Environmental Control Module, Support Structure Module, Supporting Facilities Module, Production Assistance Module.



* The structure may vary slightly depending on the enclosure dimensions and the degree of customization.

CHAPTER 3: Module Advantages

1. Suitable for all climates (zero environmental stress)



The ALT Containerized Leafy vegetables Factory integrates vertical farming, hydroponics, indoor agriculture, and multi-sized mobile containers into a fully climate-adaptive mobile farm capable of rapid deployment worldwide.

Constructed with cold-storage-grade structural design and a thermal conductivity coefficient below $0.03 \text{ W/(m}\cdot\text{K)}$, the ALT Container Plant Factory adapts to extremely hot and cold environments ranging from -35°C to 55°C (standard configuration; customizable for extreme climates). It maintains stable indoor temperatures between 10°C and

35°C, enabling year-round fresh vegetable production without sunlight or soil.

2. Suitable for all terrains

ALT Container-Based Plant Factory offers an exceptionally resilient agricultural solution. Its modular and environmentally independent design allows placement on diverse outdoor terrains or flat indoor surfaces. Compared to traditional structures, container-based plant factories deliver three key advantages:

- **Modularity and Durability**

Container structures are exceptionally sturdy, capable of withstanding wind, rain, and vibrations. As complete modules, they can be transported by truck, ship, or even helicopter to remote locations accessible by road.

- **Environmental Sealing and Independence**

The core of the plant factory lies in its internally controlled environment (temperature, humidity, light, CO₂, nutrient solution). Adverse external weather conditions can be isolated and overcome, ensuring optimal crop growth.

- **Low Infrastructure Dependency**

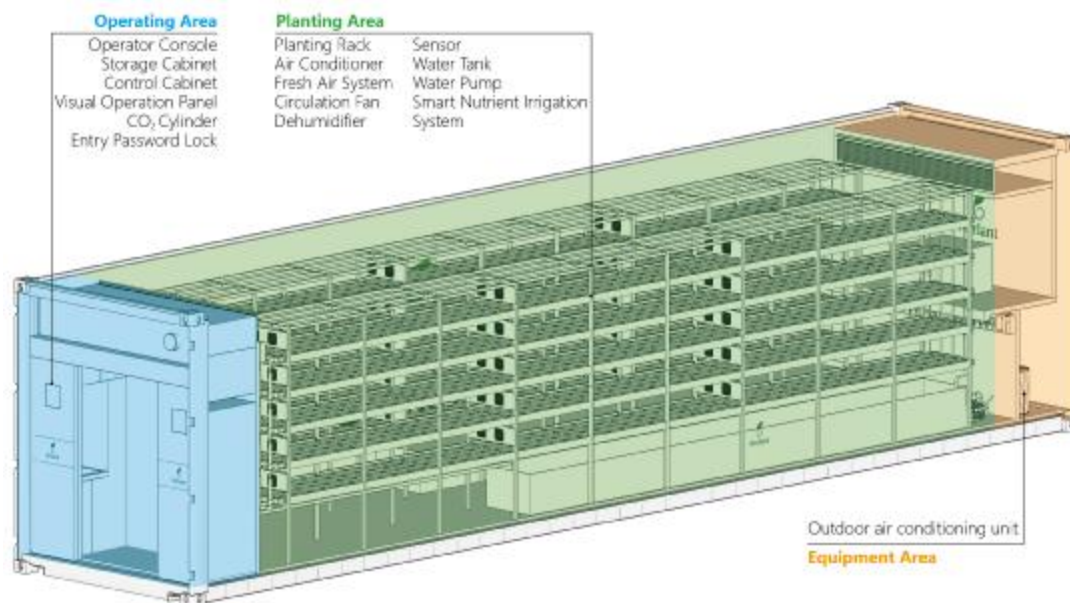
Unlike traditional agriculture, container plant factories require no vast tracts of fertile soil. They can be established on non-arable land such as concrete surfaces, sandy terrain, or gravel sites. Additionally, their reliance on and consumption of water resources are significantly reduced through recycling systems.

3. Highly Customizable Space (Full-Size Flexible Customization)

The containerized plant factory features a modular design compatible with standard-sized shipping containers. It offers highly customizable configurations tailored to client requirements and site conditions:

Type	Size	Length/ mm	Width /mm	Height /mm	Volume /cu.m	Payload /T
Standard Cube Container	20GP	6058	2438	2438	33.2	27
	40GP	12192	2438	2438	67.7	28
High Cube Container	20HC	6058	2438	2896	39.4	27
	40HC	12192	2438	2896	80.4	28

The plant factory space is divided into operational zones, cultivation zones, equipment zones, and other customized sections through compartmentalized design, ensuring comprehensive control and coordination of all ecological factors.



Flexible Mobility Modular Customization

This innovative testing platform features a groundbreaking design. Utilizing standard shipping containers as a customizable base, it can be transported via freight, sea, or crane, breaking geographical limits to provide clients with a high-quality, flexible incubation carriers.

External Isolation Stress Resistance

It employs a fully enclosed, stress-resistant design. Using modular environmental factor generators, it provides intensive control over ecological factors like "light, temperature, water, nutrients, air, and heat," adapting to the growth and physiological models of animals, crops, and microorganisms.

Durable Materials Easy Maintenance

The interior walls are constructed with corrosion and moisture-resistant SUS304 stainless steel, while the floor utilizes T-shaped aluminum resistant to low temperatures and corrosion. The structure offers high pressure resistance, and the materials facilitate easy cleaning, straightforward maintenance, and simple long-term upkeep, with a service life of ≥ 10 years.

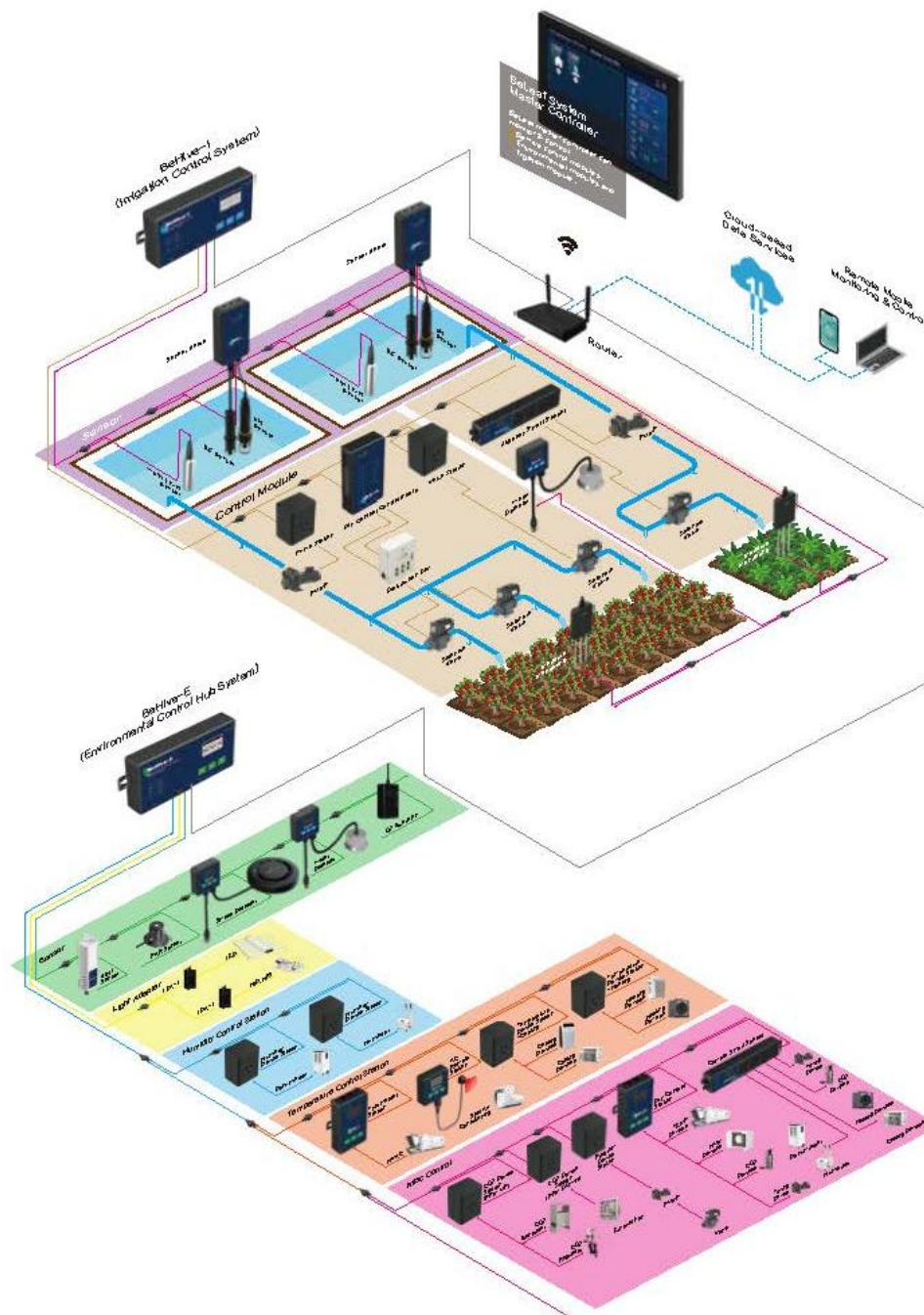
Adjustable Environment Circular Energy

Utilizing autonomous energy generation systems such as photovoltaic power and rainwater harvesting, integrated with modular ecological factor generators, to achieve seamless environmental adjustment. This embodies the design philosophy of "low energy consumption, minimal manual intervention, and renewable energy."

4. Smart Environmental Control Capabilities (Supplemental Lighting, Temperature, Humidity, Water and Fertilizer Management)

The ALT Containerized Leafy vegetables Factory utilizes the Plantaura Smart Cultivation Environment Control System. Developed by integrating agricultural IoT technology with advanced sensor data acquisition, the Plantaura System enables precise environmental control tailored to each crop stage. It independently regulates temperature, humidity, lighting schedules, irrigation plans, nutrient formulations, and CO₂ levels,

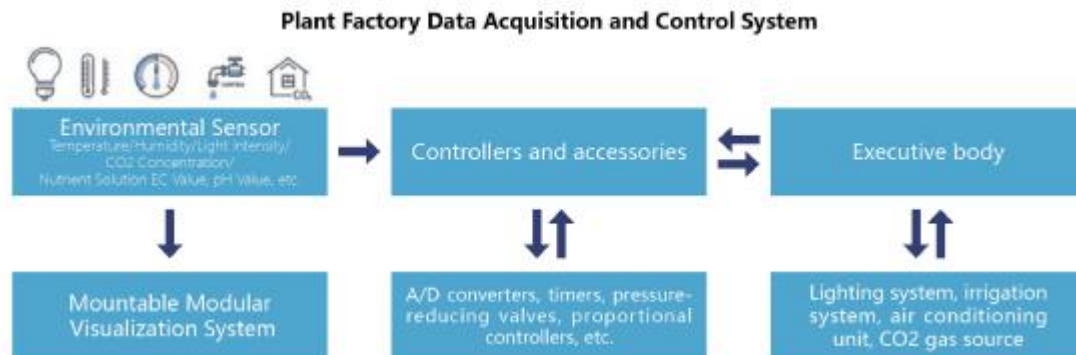
allowing crops to grow year-round regardless of natural conditions. Containerized plant factories have been widely adopted in suburban agricultural systems, research institutions, and regions with challenging environmental conditions.



- **BeHive-E Smart Environmental Control System**

The environmental control system is one of the critical systems in a plant factory, encompassing comprehensive regulation of both above-ground environmental factors—such as temperature, humidity, relative humidity,

CO₂ concentration, and light intensity — and root-zone conditions (electrical conductivity, pH, and nutrient solution temperature). This system comprises three components: sensors, controllers, and actuators.



- **Behive-I Smart Irrigation Control System**

Achieve intelligent automated irrigation with precise control over water and fertilizer supply, enabling integrated water-fertilizer management. Optimize the root zone environment to prevent diseases.

Compared to traditional irrigation methods, this approach delivers extreme water and fertilizer savings, reducing economic costs while significantly boosting crop yield and quality.

- **Aqua Smart Nutrient Fertilizer System**

Offers the best human-machine interaction model, supporting multiple fertilizer formulation settings and a planting cycle schedule system that automatically adjusts fertilizer plans according to plant growth cycles.

5. Variable Cultivation Structures (Forage Crops, Leafy Vegetables, Medicinal Crops)

Employing a modular cultivation space construction system, multi-tiered adjustable vertical cultivation racks incorporate NFT pipes, inlet pipes, outlet pipes, recirculation pipes, pressure pumps and other components. These connect to the nutrient solution automatic recirculation system via the recirculation pipework, enabling height adjustment to optimise spatial utilisation. Additionally, customisation is available to client specifications, incorporating seedling trays, seedbeds and other elements for cultivating forage crops, medicinal plants and similar.

Features a modular artificial light source system suitable for various light

source requirements.



6. Advantages of Hydroponic Forage

- Container cultivation predominantly employs multi-tiered vertical racks, maximising vertical space utilisation. Within equivalent land areas, leafy vegetable cultivation can be increased by 3-5 times;
- Enhances yield and quality: traditional ground-based lettuce cultivation requires 30-40 days, whereas container cultivation achieves maturity in 20-25 days, yielding uniformly presented produce with minimal pesticide residues;
- Reduces labour and transportation costs, as a single person can manage multiple container cultivation tasks. It also allows flexible adjustment of cultivation locations and varieties based on market demand. For instance, planting near urban communities enables short-distance delivery "from field to table," ensuring leafy greens' freshness.



7. IoT Terminal Control (Mobile App + Physical Control Cabinet)

Plantaure System supports mobile app control, enabling remote operation of key device functions, recording real-time production and test monitoring screens, and logging critical historical data. It also features a visual operation panel and physical control cabinet for simple

and convenient operation.



CHAPTER 4: Modules and Parameters

1. Planting Structure Module, Photosynthesis Module, Intelligent Environmental Control Module (Partial)

Crop Structure Module	Standard Configuration Parameters
Types of Cultivation Containers	NFT Hydroponic Piping (Food-Grade UPVC)
Cultivation Model	Hydroponics
Structural load-bearing capacity	Dynamic load: 50 kg/m ²
Material Properties	Tensile strength: ≥40MPa Temperature range: -10°C to 60°C
Protective Performance	UV-resistant (≥5 years)
Continuous operating life	8 years (routine maintenance)
Photosynthesis Module	Standard Configuration Parameters
Light Intensity Regulation	Range: 200–600 μmol/m ² /s Accuracy: ±5%
Photoperiodic Regulation	Lighting cycles can be manually set
Luminous Flux Control	White LED Full Spectrum 450-660nm
Protective Performance Parameters	IP54 (Dust and Water Resistance)
Continuous operating life	≥30,000 hours (L90 standard)
Smart Environmental Control Module	Standard Configuration Parameters
Temperature Control	Range: 5–50°C Accuracy: ±1°C
Humidity Control	Range: 5%-95% RH Accuracy: ±3% RH
Pollution Protection	Air: Primary filtration + activated carbon (PM 2.5 filtration efficiency: 95%) Water quality: RO+ UV sterilization
Water and Fertilizer Management	EC Value Control: 1.0–3.0 mS/cm (±5%) pH Value: 5.5–6.5 (±0.3)
control capability	Automation Level: 98%

	Protocol Compatibility: Modbus RTU
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2. Support Structure Module, Power Transmission Module, production Assistance Module (Partial)

Support Structure Module	Standard Configuration Parameters
Tensile Strength Parameters	≥450 MPa (Q345B steel)
Bending Strength Parameters	≥345 MPa (ASTM A572 standard)
Protective Performance Parameters	C4 Corrosion Class (ISO 12944) Salt Spray Test 720h
Load Capacity Parameters Continuous Service Life	Static load 30 tons / Dynamic load 15 tons ISO 1496 standard 15 years Annual corrosion rate < 0.1mm
Production Support Module	Standard Configuration Parameters
Toolbox Configuration	None (Optional)
Roof-mounted photovoltaic system	None (Optional)
Energy storage equipment	None (Optional)
Intelligent Monitoring System	Full-parameter monitoring (temperature, humidity, light intensity, CO ₂ , etc.)
Expansion Interface	Three interfaces reserved (water/fertilizer, gas, electricity)

* This table is a standard configuration, but all configurations can be customized or replaced according to actual requirements. Whether it's functional upgrades or cost optimization, we can provide corresponding solutions.

CHAPTER 5: Leafy vegetables Production Capacity Specifications

ALT Container-Based Leafy vegetables Factory can cultivate forage crops, leafy vegetables, medicinal plants, and more according to user requirements, while also featuring seedling propagation capabilities.

Take lettuce as an example, the crop yields and energy consumption when using containers of different specifications for lettuce are shown in the table below:

Lettuce Cultivation Yield and Annual Energy Consumption Table

Model	Number of floors	NFT pipeline length / Meter	Growth Cycle/Day	Seeding rate/ plant	Cycle output/kg	Energy consumption / per 10,000 kWh
ALT-20GP	8	128	20-25	640	128-320	4.09
ALT-20HC	10	160	20-25	800	160-400	4.44
ALT-40GP	8	320	20-25	1600	320-800	4.27
ALT-40HC	10	400	20-25	2000	400-1000	4.62

* The provided yield and energy consumption data serve as important reference points; actual results may vary depending on cultivation conditions.