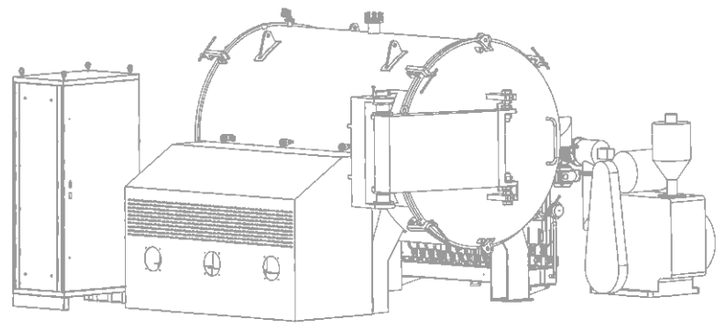
JIAYUE INTELLIGENT PRODUCT ALBUM

TO BECOME A LEADER
IN NEW MATERIAL TECHNOLOGY
AND EQUIPMENT

LEADING THROUGH TECHNOLOGY · DRIVEN BY QUALITY.



HANGZHOU JIAYUE INTELLIGENT EQUIPMENT CO., LTD

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REGIONAL DISTRIBUTION OF CUSTOMERS

JIAYUE
INTELLIGENT
DEVICE

Leading Through Technology·Driven by Quality
Customer-Centric Approach·Mutual Benefits
and Win-Win Solutions

VISION

To become a leader in the field of new material technology and equipment!

MISSION

To drive the seamless integration of processes and equipment, fostering continuous innovation in the new materials industry!

VALUES

Inclusiveness, Responsibility, Innovation, Growth!

BUSINESS PHILOSOPHY

Leading Through Technology · Driven by Quality
Customer-Centric Approach · Mutual Benefits and Win-Win Solutions!

COMPANY PROFILE _

Hangzhou Jiayue Intelligent Equipment Co., Ltd. emerges as a vanguard in the realm of cutting-edge technology, a venture nurtured under the auspices of the Hangzhou Institute of Opto-mechatronics (HIOM). It is an enterprise that amalgamates innovative material production equipment research, development, manufacturing, and sales, encapsulating the quintessence of a high-tech establishment. Its core lies the three-dimensional temperature field measurement and control technology, seamlessly interwoven with temperature field simulation, stress emulation, high-temperature vacuum, and the mastery of automation and IoT control. Guided by a design ethos that marries 'process' and 'equipment', the company is poised to dismantle the technical barriers bridging processes and equipment, with a steadfast gaze on industry sectors such as carbon materials, optoelectronic materials, and novel energy storage materials. The aspiration is grand: crafting an international hallmark for elite equipment.

Spanning two domains, the company finds its abode in Hangzhou's Fuyang and Shanghai's Jiading. These domains, spanning over 10,000 square meters, pulsate with industrial might. The headquarters, nestled in Hangzhou's Fuyang, orchestrates symphonies of research, management, finance, and manufacturing. A fully-owned offspring of the company, Shanghai Yuzhi Technology Co., Ltd., flourishes in Shanghai's Jiading, a hub encompassing marketing, scientific instrument production and sales, alongside a crucible of collaborative research and development endeavors.

A workforce of nearly 60 individuals adorns the company's ranks, an assembly adorned with 4 individuals of senior professional distinction, 5 bearers of doctoral laurels, and 3 custodians of masterly erudition. These talents resonate within the framework of Shanghai's "urgently needed high-level innovative and entrepreneurial talents", while over half the cohort boasts bachelor's degrees or higher. Luminous with intellectual property, the company holds aloft a triumphant array: 19 patents of invention, 39 utility model patents, and 11 laurels in the form of software copyrights.

Zhang Peng

Chairman and Founder of Hangzhou Jiayue Intelligent Equipment Co., Ltd.

Zhang Peng, renowned as a former Doctor of Inorganic Chemistry and Researcher at the Shanghai Institute of Applied Physics, Chinese Academy of Sciences (CAS), is at the helm of Hangzhou Jiayue Intelligent Equipment Co., Ltd. With fervor, he has devoted himself to the study of inorganic energy storage materials and related equipment. His journey encompasses pioneering work, including the development of a cutting-edge molten salt property testing system, and the establishment of China's inaugural molten salt property testing laboratory accredited by CNAS. He has led the sub-project "Th-based Molten Salt Reactor" within the CAS Strategic Priority Research Program, the sub-project "Research and Application of Key Technologies for High-Temperature Molten Salt" in Shanghai's Major Science and Technology Project, and has contributed to the National Natural Science Foundation of China's Youth Science Fund projects "Thermodynamics and Thermal Properties of Low Melting Point Multicomponent Nitrate Systems" and "Study on the Influence of Fluoride Molten Salt Structure on its Gas-Liquid Equilibrium Behavior." Zhang Peng has authored over 30 academic papers and filed more than 20 patent applications. He has earned accolades as a member of the Young Promoters Association of the Chinese Academy of Sciences, a high-level innovative and entrepreneurial talent in Shanghai's Jiading District, a '5110' Class A talent in Hangzhou City, and a talent in high demand in Hangzhou. He has undertaken numerous projects in Shanghai, Jiading District, and Hangzhou Fuyang District.

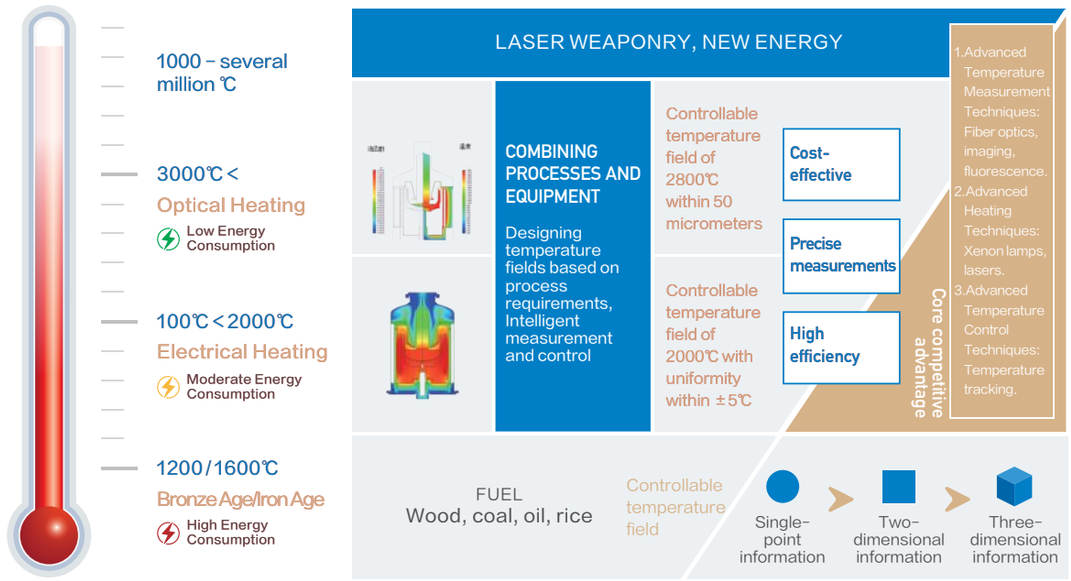
OFFICE AREA & PRODUCTION WORKSHOP _

CORE TECHNOLOGY _

Three-dimensional temperature field measurement and control technology:

This technology enables the direct acquisition of spatial information in a three-dimensional temperature field, facilitating real-time adjustments and control.

This results in more precise, simplified, and intelligent process regulation.



QUALIFICATION AND HONOR _

The company has garnered prestigious recognitions, including the High-Tech Enterprise Certificate, the Innovative Small and Medium-Sized Enterprise Certification, the Hangzhou Enterprise High-Tech Research and Development Center status, the Zhejiang Science and Technology-Based Small and Medium Enterprise Certification, and the ISO9001 Quality Management System Certification.

PATENT _

As of now, the company's principal patent applicants include Hangzhou Jiayue Intelligent Equipment Co., Ltd., and its wholly-owned subsidiary, Shanghai Yuzhi Technology Co., Ltd. The collective tally of patents and software copyrights stands at an impressive 52.

CONTENTS

JIAYUE
INTELLIGENT
DEVICE

SPECIALIZED EQUIPMENT FOR SILICON DIOXIDE

PART 01

PRODUCT

LABORATORY SILICON DIOXIDE EQUIPMENT

This equipment is designed specifically for the vacuum deposition preparation of silicon dioxide. The reaction chamber utilizes molybdenum wire resistance heating, and the collection area is constructed with a metal crucible structure. The effective evaporation area is no less than 15L.

Characteristics & Advantages

- The equipment furnace body is equipped with a vacuum pre-pumping port and a small-speed pumping port, which prevents the easy removal of powder during sintering.
- The heating elements are crafted from high-purity molybdenum wire and alumina components, placed in the reaction area. Heat radiation is directed towards the crucible to heat the product, ensuring uniform temperature distribution and heating efficiency within the effective heating area.
- The crucible in the reaction area and the collection warehouse in the collection area both feature a portable and detachable structure, facilitating easy retrieval and placement.

MAIN TECHNICAL PARAMETERS

Working Temperature	1350℃
Effective working area	Reaction area: ϕ220×600mm
Cold ultimate vacuum	6.67×10^{-3}Pa (cold state, empty furnace, after heating and degassing)
Heating element	Molybdenum wire heating

SILICON DIOXIDE PREPARATION EQUIPMENT（30KG）

This equipment is a silicon dioxide preparation system with a capacity of 30kg. It is primarily used for high-temperature reaction and collection in the preparation of silicon dioxide, while also serving as a general high-temperature atmosphere furnace. The equipment consists of a furnace body, furnace door with locking mechanism, heating system, gas charging and discharging system, vacuum system, electrical control system, water cooling system, transformer, and connecting cables.

Characteristics & Advantages

- The equipment's furnace body is equipped with vacuum pre-pumping and small-speed pumping ports, effectively preventing the inadvertent removal of powder during sintering.
- The equipment is equipped with an automated gas charging and discharging system, controlled by a closed-loop system composed of pressure sensors and electromagnetic valves. This system enables precise control over the internal atmospheric pressure of the furnace.
- Multiple-point temperature control/monitoring is implemented, enabling real-time regulation and monitoring of temperature variations throughout the sintering process.

MAIN TECHNICAL PARAMETERS

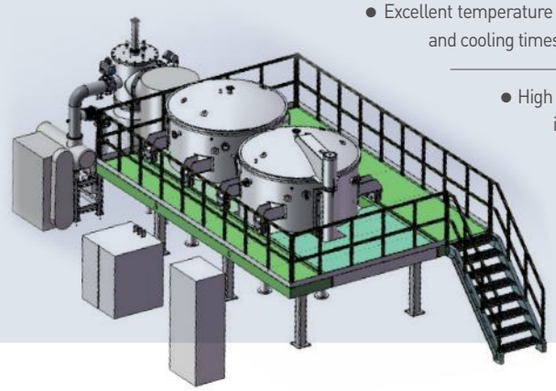
Maximum temperature	1600℃
Heating element	Graphite heating
Cold ultimate vacuum	6.67×10^{-3}Pa（cold, empty furnace, after heating and degassing）

SILICON DIOXIDE PREPARATION EQUIPMENT（500KG）

This equipment, designed for producing silicon dioxide, has a capacity of 500kg. It is primarily used for high-temperature reactions and collection during silicon dioxide preparation, while also functioning as a general high-temperature atmosphere furnace. The system comprises a furnace body, a locking furnace door, a heating system, a gas charging and discharging system, a vacuum system, an electrical control system, a water cooling system, a transformer, and connecting cables.

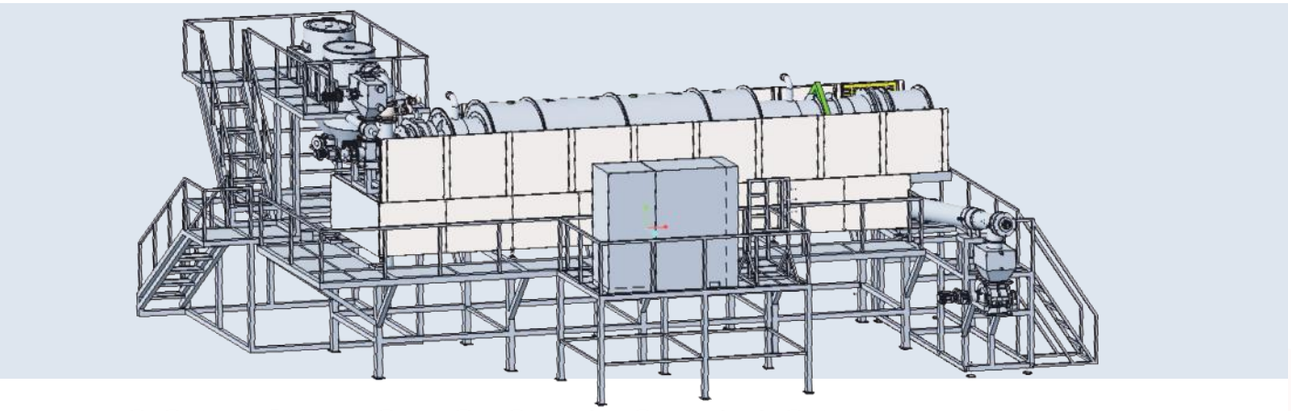
Characteristics & Advantages

- Independent temperature control for the reaction zone, transition zone, and collection zone ensures uniform temperature control. This results in stable production of SiO products with high quality.
- Significant reduction in energy consumption, with energy consumption as low as 18 kWh per kilogram currently, making energy costs market-friendly.
- Excellent temperature field structure that significantly shortens heating and cooling times, leading to high operational efficiency.
- High material collection efficiency, up to 90%, enhancing material utilization rates.



MAIN TECHNICAL PARAMETERS

Effective working area	ϕ900×1000mm
Maximum temperature	1600℃
Cold ultimate vacuum	6.67×10^{-1}Pa（cold state, empty furnace, after heating and degassing）



CONTINUOUS CVD CARBON COATING EQUIPMENT

This equipment is a continuous CVD furnace designed for gas-phase deposition of carbon coatings on silicon/silicon dioxide anode materials. It utilizes mixed gases such as nitrogen, acetylene, and methane. It is suitable for loose, non-corrosive powdery materials that do not contain strong acids or bases.

The furnace maintains a constant temperature for a duration of 1 to 4 hours (in the heating zone, subject to customer process requirements). The maximum filling rate in the product tube is approximately 5% to 20% (determined based on the material characteristics and coating process specified by the customer).

Characteristics & Advantages

- The furnace tube is made of 310S stainless steel plate and is welded as a whole. Non-destructive testing is performed on all welds, and the furnace tube is solid-solution treated. The furnace head employs a combination of filling lubrication, elastic sealing, air ring sealing, and grease ring sealing for end-face sealing. These sealing methods ensure excellent sealing performance between moving and stationary parts, enabling long-term use at high temperatures. Independent circulating water cooling is applied to cooling the sealed structure, reducing the evaporation of lubricating grease at sealing sites.

- The design of the gas inlet pipeline is situated at the discharge end of the furnace tube, with the gas flow directed opposite to the material movement. The gas inlet pipeline comprises a mixed gas inlet for nitrogen and carbon source gases, as well as a separate nitrogen inlet. The gas flow rate is controlled by a mass flow meter, allowing for precise regulation of the gas mixture ratio. The gas inlet pipe extends to the high-temperature zone of the furnace tube. The material of the gas inlet pipe is 310S stainless steel. The gas inlet pipe can be independently disassembled during furnace operation for easy cleaning of internal deposits.

- The design of the exhaust pipe is situated at the feed end of the furnace tube and runs parallel to the feed spiral, with the gas flow directed opposite to the material movement. The exhaust gas is ultimately discharged outside the furnace. The exhaust pipe is designed for independent cleaning to prevent powder deposits from causing blockages in the flue and hindering smooth exhaust. To avoid uncontrollable pressure inside the furnace, a dust collection bin is located at the bottom of the exhaust pipe route.

MAIN TECHNICAL PARAMETERS

Installed power	220kW
Heating mode	Electric heating
Cylinder speed	0.06–1.5 rpm

CARBON MATERIALS SPECIALIZED EQUIPMENT

PART 02

SINGLE-WALLED CARBON NANOTUBE GROWTH EQUIPMENT - LABORATORY TYPE

This equipment is specifically designed for laboratory-scale production of single-walled carbon nanotubes.

Characteristics & Advantages

- The vacuum system comprises a pump assembly and valve vacuum piping. Incorporating a mechanical pump and premium valves, this system can swiftly attain the required vacuum level within a relatively brief period (not exceeding 30 minutes).
- The water cooling system provides controlled-temperature coolant to various equipment components, including the furnace body, electrodes, and seals, ensuring optimal safety measures.
- The furnace shell exhibits a dual-layer structure, encompassing inner and outer plates with an S-shaped rib plate securely welded in between. This innovative layout extends the water circulation pathway and enhances the efficiency of the water cooling function.

MAIN TECHNICAL PARAMETERS

Effective working area	Φ80-100mm
Heating zone	Five zones
Heating element	Silicon Molybdenum Rod
Maximum temperature	1500℃

PRODUCT

SINGLE-WALLED CARBON NANOTUBE GROWTHEQUIPMENT - PRODUCTION TYPE

carbon nThis equipment is designed for the industrial-scale production of single-walled anotubes.

Characteristics & Advantages

- The vacuum system incorporates a pump assembly and valve vacuum piping. Employing a mechanical pump and premium valves from renowned brands, this system can efficiently attain the required vacuum level within a relatively short timeframe (not exceeding 30 minutes).
- The water cooling system comprises separate inlet and outlet pathways, providing temperature-controlled coolant to various components such as the furnace body, electrodes, and seals. This design ensures equipment safety.
- The furnace shell boasts a dual-layer structure, consisting of inner and outer plates with an S-shaped rib plate securely welded in between. This configuration extends the water circulation pathway and enhances water cooling efficiency.

MAIN TECHNICAL PARAMETERS

Effective working area	Φ220-230mm
Heating zone	Five zones
Maximum temperature	1400℃
Remarks	Support multiple integration

CARBON PAPER CARBONIZATION SPECIALIZED EQUIPMENT

This equipment is designed for the specific purpose of carbonizing carbon paper. It operates as an externally heated vacuum resistance furnace. After initial vacuum pumping, the furnace is filled with a protective atmosphere for thermal processing. The heating furnace consists of components such as the furnace body, furnace lid, lifting system, heating elements, vacuum system, protective gas system, exhaust system, water cooling system, and electrical control system.

Characteristics & Advantages

- The equipment is equipped with stable pressure control within the range of 0.102-0.105 MPa.
- Protective Gas System: Mass flow meters are displayed on the touch screen. An automatic gas supply system for introducing protective gas controlled by a mass flow controller is provided. All gas pipeline components are logically arranged, with valves and MFCs placed under the operating platform.
- The furnace shell of the equipment is welded from angle steel and steel plates. The interior of the furnace shell is lined with lightweight refractory materials to meet the requirements of heating and cooling of the electric furnace.

MAIN TECHNICAL PARAMETERS

Effective working area	Φ1600-1400mm
Heating zone	Three zones
Heating element	Resistance wire
Maximum temperature	1050℃

PRODUCT

CARBON PAPER GRAPHITIZATION SPECIALIZED EQUIPMENT

This equipment is an efficient and advanced vacuum composite material manufacturing device, primarily designed for vacuum sintering of carbon-carbon composite materials. The furnace allows for heating, temperature measurement, temperature control, and cooling without compromising the vacuum environment. The equipment utilizes a controllable silicon power supply with features such as stable output power, frequency capabilities exceeding the inherent frequency of the furnace, and high electrical efficiency. This equipment is capable of sintering composite materials of size φ1600×1400mm in a single cycle.

Characteristics & Advantages

- The temperature measurement device consists of both thermocouple temperature measurement and infrared temperature measurement. The side thermocouple temperature measurement is driven by a cylinder, lowering the temperature measurement rod above the heating chamber to measure the low-temperature region (0~1400 ℃). When the temperature exceeds 1400℃, the thermocouple automatically retracts, and the infrared temperature measurement device takes over to measure the high-temperature region.
- The water cooling system for the melting induction coil has separate temperature, pressure, and flow rate detection and alarm devices. The water collection tray is equipped with an inlet for emergency water supply in case of abnormal conditions such as water or power interruption.

MAIN TECHNICAL PARAMETERS

Effective working area	Φ1600X1400mm
Load capacity	1500KG
Heating element	Graphite heating
Maximum temperature	2700℃

GRAPHENE FILM CARBONIZATION SPECIALIZED EQUIPMENT

This apparatus is a horizontal high-temperature carbonization furnace designed for the carbonization of polyimide films, carbon/carbon composite materials, graphite felts, carbon fibers, graphite materials, and products at intermediate to low temperatures. The setup encompasses a furnace body, a heating system, gas charging and discharging system, vacuum system, electrical control system, water cooling system, transformer, and interconnecting cables.

Characteristics & Advantages

- Heating employs high-purity graphite as the heating element, distributed around the furnace to ensure temperature uniformity. High-purity graphite boasts exceptional purity, devoid of volatiles, thus ensuring cleanliness within the chamber.

- The vacuum system employs a sliding valve pump configuration, consisting of a sliding valve pump, pneumatic high-vacuum baffle valve, inflation valve, deflation valve, vacuum pressure gauge, among others, enabling rapid vacuum evacuation. A filtering adsorption device is positioned between the vacuum pump and the furnace body to protect the vacuum pump. Metal bellows connections are employed in vacuum pipelines to attenuate vibrations.

MAIN TECHNICAL PARAMETERS

Maximum temperature	1600℃
Effective working area	600×600×2000mm
Heating zone	Three zones
Heating elements	Graphite heating

PRODUCT

GRAPHENE FILM GRAPHITIZATION SPECIALIZED EQUIPMENT

This equipment is a vacuum induction graphite furnace, primarily used for high-temperature heat treatment of carbon/carbon brake discs and carbon/ceramic brake discs. The equipment comprises a furnace shell, heating and insulation system, vacuum system, gas charging system, cooling system, control system, pneumatic system, inlet system, and automated control system.

Characteristics & Advantages

- The furnace is equipped with safety explosion-proof valves, and an electric contact pressure sensor is strategically positioned between the furnace exhaust pipe and the filtration system, serving the purpose of monitoring furnace pressure and triggering overpressure alarms.

- The heating and insulation system comprises induction coils, heating elements, and advanced insulation materials. Employing the sophisticated technique of medium-frequency induction heating, the system's ingeniously designed structure ensures precise attainment of the required furnace temperature as dictated by the process.

- The gas charging system is channeled through the upper gas inlet of the furnace into the temperature zone. It is outfitted with both electrically controlled and manually operated exhaust valves. Furthermore, an automatic exhaust valve for safeguarding against explosion-induced overpressure is incorporated, boasting a diameter of no less than 10mm.

- A distinctive feature lies in the incorporation of dual-temperature control mechanisms—utilizing low-temperature thermocouples in conjunction with high-temperature infrared instruments—resulting in comprehensive and meticulous temperature control across the full range, thereby widening the spectrum of applicable processes.

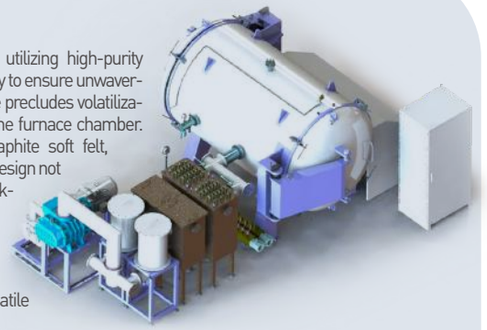
MAIN TECHNICAL PARAMETERS

Effective working area	Φ600×1200mm
Heating element	Inductive heating
Maximum temperature	3000℃
Temperature control precision	±2℃

PI FILM CARBONIZATION SPECIALIZED EQUIPMENT

This apparatus constitutes a horizontal high-temperature carbonization furnace, primarily tailored for the carbonization of polyimide films, alongside the mid-to-low temperature carbonization of carbon/carbon composite materials, graphite-based felt, carbon fibers, and graphite-based products. The equipment encompasses a furnace enclosure, a sophisticated heating system, precision gas introduction and exhaust mechanisms, an advanced vacuum infrastructure, a comprehensive electrical control arrangement, a state-of-the-art water cooling setup, a transformer unit, and interconnecting cables.

Characteristics & Advantages



- Thermal Field Design: The thermal field is meticulously fashioned utilizing high-purity graphite as the heating element, judiciously arrayed around the periphery to ensure unwavering thermal stability. The elevated purity level of the high-grade graphite precludes volatilization concerns, effectively safeguarding the pristine cleanliness within the furnace chamber. Insulating materials are ingeniously enveloped in high-strength graphite soft felt, meticulously cocooning the crucible (crafted from graphite plates). This design not only ensures exceptional insulation properties but also imparts remarkable resilience against mechanical impacts. The entire insulating barrier is steadfastly secured by a metallic framework, ensuring streamlined installation and facilitative maintenance. Temperature regulation is astutely administered through the deployment of tungsten-rhenium thermocouples, renowned for their elevated dependability, versatile applicability, and enduring operational lifespan.
- Condensation, Degreasing, and Filtration System Design: A dual-exit condensation, degreasing, and filtration system is thoughtfully crafted. The extraction port is intricately linked to the chamber through precisely engineered conduits. The system adroitly navigates through a copper tube fin condenser unit, subsequently passing through a steel wire ball/scrubbing pad filtration assembly, culminating in the sophisticated K3250 filter module. The amalgamation of these components seamlessly converges into the screw pump + Roots pump vacuum system, ensuring the optimal balance between extraction velocity and filtration efficacy.
- Ingenious Electrical Control System Configuration: The electrical control system showcases an assemblage of sophisticated components, including an interactive touchscreen interface, a meticulously designed electrical cabinet, precision-engineered contactors, meticulously calibrated current transformers, advanced thyristor modules, intuitive temperature controllers, illuminating indicator lights, a robust PLC unit, and other intricately integrated elements. Esteemed brands such as Chint or equivalent have been conscientiously chosen for their reputable standing. Temperature regulation is achieved through a cutting-edge programmable intelligent temperature regulation instrument sourced from distinguished European manufacturers. This instrument ensures temperature precision within ±1°C and offers a diverse suite of functionalities, encompassing PID adjustment, real-time over-temperature alarms, open-circuit indications, precise temperature compensation, and more.

MAIN TECHNICAL PARAMETERS

Temperature Detection	Tungsten rhenium thermocouple
Design maximum temperature	1600℃
Effective working area	Reaction area: 600×600×2000mm
Heating element	Graphite rod heating

PRODUCT
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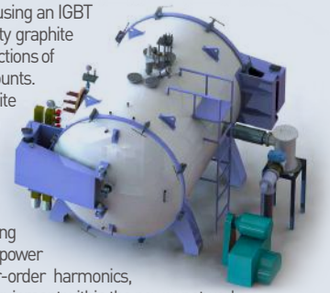
PI FILM GRAPHITIZATION SPECIALIZED EQUIPMENT

This equipment represents a horizontal high-temperature graphite annealing furnace, meticulously designed for specialized processes such as graphene heat dissipation films and PI films, among other graphiteization applications. Additionally, it boasts the capability to function as a conventional high-temperature atmosphere furnace. The apparatus is comprehensively composed of a furnace chamber, medium-frequency heating system, gas loading and purging system, vacuum system, electrical control system, water cooling system, and other integral components.

Characteristics & Advantages



- Medium-Frequency Heating System Design: The thermal field is orchestrated using an IGBT medium-frequency power supply that induces heating in the interior high-purity graphite crucible. The inductor is structured in a square spiral arrangement, with three sections of coil distribution, securely fastened within the furnace body through support mounts. Inside the inductor, alumina bricks are employed as insulators, while the graphite crucible is meticulously fabricated from high-purity graphite, assembled in segments. This construction ensures high purity, devoid of volatiles, effectively guaranteeing the cleanliness of the furnace chamber. The application of graphite soft felt results in excellent heat resistance and impact resistance, withstanding temperatures of up to 3000 degrees. The medium-frequency power supply adopts an IGBT medium-frequency power supply system, offering energy savings of approximately 15-20% compared to conventional KGPS power supplies. It boasts high electrical efficiency exceeding 95%, minimal higher-order harmonics, causing minimal grid pollution, and no interference with the operation of other equipment within the power network.
- Gas Loading and Purging System Design: This equipment is equipped with an automated gas loading and purging system, comprising flow meters, solenoid valves, manual valves, pressure sensors, connectors, and more. A closed-loop control system is established using pressure sensors and solenoid valves, enabling control over the furnace atmosphere pressure. When the furnace pressure surpasses the designated value, the exhaust valve automatically opens for pressure relief. Manual valves can be adjusted to regulate gas flow according to specific circumstances. Concurrently, introducing an appropriate amount of inert gas can regulate the vacuum atmosphere within the furnace.
- Electrical Control System Design: The electrical control system includes components such as a touch screen, electrical cabinet, contactors, transformers, temperature controllers, indicator lights, and PLC. Key brands utilized are of the caliber of Schneider. Temperature controllers are programmable intelligent instruments sourced from reputable brands, ensuring a control accuracy of ±1°C. They encompass PID adjustment, over-temperature alarms, open-circuit indicators, temperature compensation, and more.

MAIN TECHNICAL PARAMETERS

Limit temperature rise rate	<15℃/min
Design maximum temperature	3000℃
Heating method	Medium frequency induction heating, graphite crucible heat transfer
Detection unit	Pressure sensor, mechanical pressure gauge

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DEVICE

MOLTEN SALT SPECIALIZED EQUIPMENT

01 | Molten Salt Vacuum Distillation System

02 | Electrolyte Molten Granulation System

03 | Molten Salt Electrolytic Refining System

PART 03

PRODUCT

MOLTEN SALT VACUUM DISTILLATION SYSTEM

Vacuum distillation, a physical process, boasts technological features such as simplicity in process principles, easy process control, suitability for continuous processing, and minimal generation of new waste. It finds extensive application in the purification of molten salts. This specialized equipment is designed for process exploration involving molten salt purification, separation, and recovery in laboratory settings. It is suitable for fluorides, chlorides, bromides, and other compounds of rare elements such as uranium and zirconium, alkali metals, and alkaline earth metals.

Characteristics & Advantages

- The furnace chamber incorporates a 1400-type alumina polycrystalline fiber vacuum-formed structure, ensuring impeccable insulation and thermal retention; high-temperature alloy heating wires, uniformly arranged in a partially exposed manner, are securely embedded along the circumferential surface of the furnace chamber, thereby ensuring optimal temperature uniformity within the furnace.
- The vacuum distillation apparatus serves the purpose of creating an environment characterized by reduced pressure (vacuum), minimal water and oxygen content, and elevated temperatures. This configuration facilitates the implementation of distillation techniques for segregating molten salts from metallic mixtures while simultaneously enabling the reclamation of molten salt or metal constituents.

MAIN TECHNICAL PARAMETERS

Effective working area	ϕ200×450mm
Heating element	Resistance wire
Maximum temperature	1000℃
Heating Temperature Zone	Three zones
Protective atmosphere	Nitrogen or argon
Gas flow control	Mass flow meter

ELECTROLYTE MOLTEN GRANULATION SYSTEM

This system is designed for the molten, granulation, crushing, grinding, and encapsulation processes of ternary LiCl-LiBr-LiF molten electrolyte or binary LiCl-KCl electrolyte. The system employs a glove box with isolation and sealing, ensuring that the entire production process is carried out under closed conditions, effectively isolating it from the external environment. Any exhaust generated during the production process is drawn out by a vacuum pump and subsequently treated by an exhaust gas treatment unit. After undergoing absorption by an alkaline solution, the treated exhaust can be directly discharged without dispersing into the working environment.

Characteristics & Advantages

- This system utilizes the method of dissolving solid powder in high-temperature liquid molten salt, eliminating the need for the conventional muffle furnace's temperature ramping processes. This results in swift melting speeds, reduced processing times, lower energy consumption, and enhanced production capacity. The maximum melting speed is 10 kg/hour, with a peak heating temperature of 1000°C.

- Employing a drum granulation approach, a metal inlet pipe is connected to a ceramic distribution sieve. Molten salt, overflowing from the melting device, enters the ceramic molten salt distribution sieve and solidifies into granules as it cools on the outer wall of the drum jacket. Circulating water within the drum jacket aids in cooling the molten salt on the outer wall, turning it into granules that fall into the bottom material box. The material box has a volume of 5L, with a capacity of approximately 7-8 kg. The bottom of the material box features an electrically operated pusher mechanism. Once each material box is fully loaded, the second material box is electrically pushed into the collection position, while the first material box is pushed out for cooling.

MAIN TECHNICAL PARAMETERS

Effective working area	ϕ200mm × 500mm
Heating element	Resistance Wire
Maximum temperature	1000℃
Pelletizing method	Roller pelletizing, internal water-cooled jacket cooling
Maximum melting speed	10kg/h

PRODUCT

MOLTEN SALT ELECTROLYTIC REFINING SYSTEM

The Molten Salt Electrolytic Refining System is primarily employed for the electrolytic preparation and purification of rare metals such as vanadium, titanium, beryllium, uranium, and zirconium, as well as for coating processes and technologies within the electroplating system. The system primarily consists of a high-temperature furnace, control system, and molten salt electrolytic system. The equipment is mainly utilized for the development of electrolytic and electroplating processes, allowing real-time control and monitoring of internal furnace temperature data to obtain optimized process parameters.

Characteristics & Advantages

- Heating System: The heating apparatus is designed with a split-opening structure and employs dual temperature zone control. Each temperature zone has a maximum operating temperature of not less than 1000°C, ensuring that the electrolytic cell remains within a stable and constant temperature zone. The system features a dual-shell structure and a 50-segment programmable temperature control system. Phase-shift triggering and thyristor control are used, and the furnace chamber is made of imported 1200-grade alumina polycrystalline fiber material. This design offers advantages such as balanced temperature distribution, low surface temperature, rapid temperature ramp-up and ramp-down rates, and energy efficiency.

- Electrochemical Apparatus: Comprising an electrochemical workstation or a direct current power supply, electrolytic crucible (shell), electrolytic cell, electrodes, and connecting components, this apparatus constitutes the core components for electrochemical research or electrolytic production. The design of the electrolytic cell can be tailored to experimental or production requirements and is easily detachable for convenient replacement. The electrolytic crucible is resistant to high-temperature molten salt vapor corrosion, with a normal service life of no less than two years.

MAIN TECHNICAL PARAMETERS

Effective working area	ϕ200mm × 500mm
Heating element	Resistance wire
Maximum temperature	1000℃
Measuring method	N-type thermocouple
Temperature control precision	±1℃

PART 04

OPTOELECTRONIC MATERIAL GROWTH EQUIPMENT

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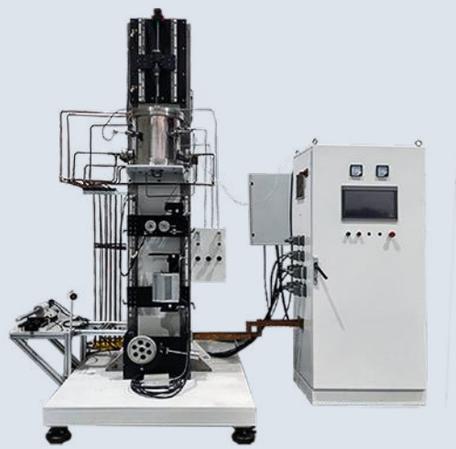
DEVICE

PRODUCT

WIRE DRAWING TOWER (SMALL)

The wire drawing tower is used for the drawing of silicate, phosphate, multi-component sulfides, high-silica, and polymer materials such as PMMA, PS, PC, CYTOP, and other specialty optical fibers. It is positioned for new product research and development as well as small-batch production, catering to customers' customized equipment requirements.

Characteristics & Advantages



- The heating system employs a vertical three-zone tube-type configuration, featuring three distinct heating segments, each spanning 100mm in length with a diameter of 45mm. Independent temperature control is applied to these three heating zones. Operating within a temperature range of 200°C to 1100°C, the system maintains a temperature control precision of ±1°C.

- The tension system integrates a sophisticated three-wheel modular tension detection apparatus. Precise regulation of furnace temperature is achieved through meticulous feedback of tension data, effectively addressing issues stemming from temperature overshooting or undershooting, which may lead to material deformation or inconsistent wire diameter during the drawing process.

- The primary traction mechanism employs a spring-loaded, lever-arm design for micro-scale traction, utilizing a pressure belt system. Synchronized operation of two sets of traction wheels is achieved through a high-precision M-E AC servo control system, wherein the traction wheels' rotation is driven by a reducer. Furthermore, the system incorporates recording capabilities for enhanced process monitoring.

MAIN TECHNICAL PARAMETERS

Maximum temperature	1200℃;
Prefabricated rod diameter	ϕ10 ~ ϕ40mm;
Number of heating sections	3 segments, each segment independent temperature control

WIRE DRAWING TOWER (LARGE)

The dual-furnace drawing tower is designed with a modular approach, consisting of distinct components such as the tower framework system, feedstock delivery mechanism, mid-to-high temperature dual-furnace heating system, coating/curing system, traction system, tension detection system, take-up system, diameter measurement system, and electrical control system.

Characteristics & Advantages

- The heating system is ingeniously designed, comprising two autonomous heating furnaces: one featuring medium-temperature resistance heating and the other utilizing high-temperature graphite heating. The seamless horizontal switching capability between these two furnaces is a notable feature.
- The tension system is distinguished by its three-wheel modular tension detection apparatus. Through a dynamic tension feedback mechanism, precise regulation of furnace temperature is achieved, effectively mitigating potential issues stemming from temperature overshoot or undershoot. These issues could potentially lead to material deformation or inconsistent wire diameter during the drawing process.
- The primary traction mechanism adopts a sophisticated spring-loaded, lever-arm configuration for micro-scale traction, employing a pressure belt system. The synchronized operation of dual sets of traction wheels is impeccably managed through a high-precision M-E AC servo control system, driving the rotation of the traction wheels via a precision reducer. Furthermore, the incorporation of recording capabilities enhances the monitoring of the traction process.

MAIN TECHNICAL PARAMETERS

Heating element	High-temperature heating furnace is high-purity graphite; medium-temperature heating furnace is resistance wire;
Preform diameter	ϕ10 ~ ϕ50mm, length≤1500mm;
Prefabricated rod stroke	1000mm;
Common working temperature	The high-temperature heating furnace is ≤2000±1℃; the medium-temperature heating furnace is: ≤1100±1℃;
Temperature zone length	The length of both furnaces' temperature zones is 5cm, and the interval of temperature zones is 5cm;

PRODUCT

CZT CRYSTAL GROWTH FURNACE

This apparatus is predominantly employed for cultivating single crystal materials of Cadmium Zinc Telluride (CZT) using the crucible descent technique. The heating region of the equipment is segmented into 7 temperature zones under autonomous regulation, encompassing an operational temperature range spanning 1000 to 1150°C. The heating elements integrated into the system comprise imported Kanthal heating wires. The diameter of the working chamber (furnace inner diameter) measures 180mm, while the furnace body can sustain uninterrupted operation for a minimum of 30 days. Throughout the single crystal growth process, the CZT material is hermetically sealed within a quartz crucible.

Characteristics & Advantages

- Heating Components: The heating elements are meticulously fabricated from imported Kanthal spiral wires, boasting an inner diameter of 180mm and an outer diameter of 370mm (with a unilateral insulation layer thickness measuring 95mm). The entirety of the furnace body is ingeniously assembled from multiple heating units, collectively partitioned into 7 distinct temperature control zones.
- Furnace Elevation and Support Rod Rotation Control: Control methodologies encompass computerized automatic regulation, manual operation, and remote manipulation. The control mechanism for furnace elevation can seamlessly transition between manual, automatic, and remote control modes, affording optimal flexibility.
- The comprehensive installation of the furnace body meticulously adheres to stringent anti-vibration stipulations, ensuring meticulous mitigation of any perturbations arising from furnace body oscillations during the crystal growth process.

MAIN TECHNICAL PARAMETERS

Effective working area	ϕ180×1130mm
Heating element	Resistance Wire
Maximum temperature	1050° C
Measuring method	S-type thermocouple
Temperature control precision	≤±1℃

TEN-POSITION CRUCIBLE DESCENDING CRYSTAL GROWTH FURNACE

This equipment features a tri-segmented temperature zone heating configuration, with each individual temperature zone encompassing a furnace chamber constructed from imported Kanthal resistance wire-wound alumina polycrystalline fibers. Achieving an impressive maximum temperature of 1200°C, the furnace's working area dimensions approximate 2000120670 (length * width * height). Notably, the ten-position lifting and loading platform is linearly arrayed, with each platform affording autonomous elevation control, ensuring an unhindered operation. The platforms boast adjustable lifting speeds, characterized by fluid motion devoid of any obstructions or oscillations. Each singular loading platform showcases an appreciable load-bearing capacity of up to 10 kg.

Characteristics & Advantages

- Heating Components: Distinguished by the adoption of resistance wire heating, the heating elements manifest superior efficiency. Insulation Layer: Crafted from top-tier, high-purity alumina polycrystalline fiber material, the insulation layer is meticulously molded through advanced Japanese vacuum adsorption forming technology. The furnace's overarching structure integrates multiple discrete heating units, collectively organized into three precisely managed temperature control zones.
- The electrical control facet assumes versatility, with options for either a standalone control cabinet or an amalgamated control cabinet seamlessly integrated into the furnace's core framework. The latter incorporates a range of indispensable electrical components, encompassing circuit breakers, air switches, power adjusters, relays, and PLCs, among others. The pièce de résistance, a 12-inch touch screen, serves as the central control panel. It empowers operators to intricately craft and adapt temperature profiles through intuitive touchscreen interactions, all while enabling the recording of historical operational curves for streamlined data retrieval and in-depth analysis.

MAIN TECHNICAL PARAMETERS

Maximum temperature	1200℃
Number of heating zones	Three zones
Temperature measurement	S-type thermocouple
Temperature zone uniformity	±1℃

PRODUCT

EXTRUSION MACHINE

This apparatus is principally designed for the fabrication of pre-fabricated rod materials, demonstrating a pronounced scholarly significance.

Characteristics & Advantages

- The apparatus adopts a fully sealed isolation chamber, wherein heating and extrusion processes are completed. The junctures employ a highly precise and adjustable optical attenuator module.
- For both melting and annealing phases, a comprehensive program-controlled temperature elevation system is employed. This system offers swift temperature transitions, tunable thermal profiles, and a notable precision in temperature control.
- The extrusion procedure employs a servo mechanism, boasting meticulous control accuracy, consistent operation, and the absence of vibrations or oscillations.
- The lower annealing system is driven by a servo motor that operates a screw mechanism for vertical movement. It provides adjustable speeds while ensuring stability without any tremors or shakiness.
- The holistic framework is meticulously fabricated through steel welding and processing, subsequently coated with high-temperature paint on the surface. A leveling mechanism is installed at the base to ensure a robust and stable installation.

MAIN TECHNICAL PARAMETERS

Heating Furnaces	Furnace chamber dimensions	ϕ150×130mm
Annealing Furnaces	Furnace chamber dimensions	ϕ50×500mm
Extrusion systems	Pressure range	0-1.8T
Lifting system	Stroke	0-1000mm

PART 05

VACUUM EQUIPMENT

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INTELLIGENT
DEVICE

VACUUM CARBON TUBE FURNACE

This equipment is a horizontal vacuum high-temperature sintering device, primarily used for vacuum high-temperature sintering of structural ceramics, composite materials, and other materials, as well as atmosphere-protected sintering.

Characteristics & Advantages

- The vacuum system is equipped with a two-stage pump configuration, consisting of a sliding valve pump, Roots pump, pneumatic high-vacuum baffle valve, inflation valve, exhaust valve, vacuum pressure gauge, pressure control instrument, etc., which enables rapid vacuum pumping.
- Heating is accomplished using high-purity graphite as a heating element, arranged in a square layout around the periphery, ensuring temperature field stability. The high purity of the graphite material prevents volatilization, effectively maintaining the cleanliness of the furnace chamber.
- A thermal couple is positioned outside the heat-insulating screen to monitor the external temperature, enhancing the safety performance of the equipment.

MAIN TECHNICAL PARAMETERS

Effective working area	800×800×2200 mm（W*H*L mm） 600×600×1200 mm（W*H*L mm）
Heating element	Graphite heating
Maximum temperature	2000℃
Heating zone	3 zone
Cold ultimate vacuum	≤1Pa (cold state, empty furnace, after heating and degassing)

VACUUM ANNEALING FURNACE

The vacuum tempering furnace, utilizing high-temperature molybdenum-lanthanum alloy strips as heating elements, serves as a vacuum resistance furnace. It is primarily employed for annealing and tempering processes of materials such as high-speed steel, high-alloy steel, stainless steel, and titanium alloys.

Characteristics & Advantages

- This equipment features a proprietary segmented heat-insulating screen made from stainless steel and molybdenum materials. Consisting of a total of five layers, the first layer is composed of molybdenum plate, while layers 2 to 5 are constructed from stainless steel. Grid bars, dowels, connecting rods, and other components are entirely fashioned from molybdenum or tungsten materials.

- Heating is achieved through the utilization of high-purity graphite as the heating element. Arranged in a square pattern around the periphery, this design ensures stability in the temperature field. The high purity of the graphite material prevents volatilization and effectively maintains the cleanliness of the furnace chamber.

- The water cooling system, with separate inlet and outlet pathways, provides temperature-controlled coolant to various parts of the furnace, including the furnace body, power supply unit, electrodes, and gaskets. This ensures controlled cooling and contributes to the safety of the equipment.

MAIN TECHNICAL PARAMETERS

Maximum temperature	1200℃
Temperature uniformity	⩽±5℃,
Temperature rise speed	No load from room temperature to 900℃⩽1h Temperature increase rate can be adjusted in the range of 1-25℃/min.
Working vacuum	5×10^{-3}Pa
Pressure rise rate	⩽0.2Pa/h

PRODUCT

VACUUM BRAZING FURNACE

The vacuum brazing furnace is primarily employed for the vacuum brazing of materials such as stainless steel, copper, titanium alloys, high-temperature alloys, and hard alloys. Typical brazing products include various stainless steel plate heat exchangers, EGR (exhaust gas recirculation) systems, diamond tools, and optical instruments.

Characteristics & Advantages

- The upper and lower furnace doors are constructed using standard heads and flange plates. The furnace door, furnace body, and flange plate are all designed with a dual-layer structure using 304 stainless steel plates. A spiral water-sealing ring is placed between the two layers, allowing cooling water to effectively cool the casing and sealing area. This ensures sealing integrity and prolongs the service life of the sealing ring.

- The water cooling system includes valves and flow sensors in the branches that enter the furnace body. This system accurately monitors water pressure, temperature, and flow rate. In case of any abnormal situations, the equipment generates audio and visual alarms, displays pop-up windows on the control interface, and activates safety interlocks to ensure the safe operation of the equipment.

MAIN TECHNICAL PARAMETERS

Temperature uniformity	⩽±5℃
Heating elements	Tungsten/Molybdenum
Temperature detection	Type C tungsten rhenium thermocouple
Operating mode	Touch screen automatic control / on-site manual operation
Working vacuum	6.67×10^{-3}Pa

PRODUCT

VACUUM TUNGSTEN WIRE FURNACE

The vacuum tungsten wire furnace is a bottom-lifting vacuum resistance furnace that employs tungsten mesh as the heating component. Its principal application lies in the sintering or annealing procedures of products crafted from metals, alloys, transparent ceramics, crystals, and other inorganic substances. These processes occur within an environment of either vacuum or a protective atmosphere.

Characteristics & Advantages

- The upper and lower furnace doors are constructed using standard heads and flange plates, with a dual-layer configuration of 304 stainless steel plates for the furnace door, body, and flange plate. This design incorporates a spiral water-sealing ring between the dual layers, enabling efficient cooling of the casing and sealing region by the cooling water. This ensures the integrity of the seal and extends the lifespan of the sealing ring effectively.

- The water cooling system encompasses valves and flow sensors installed in the pathways that feed into the furnace body. This system effectively monitors water pressure, temperature, and flow rate. In instances of abnormal occurrences, the equipment activates audio and visual alarms, initiates pop-up displays on the control interface, and engages safety interlocks to ensure the secure operation of the apparatus.

MAIN TECHNICAL PARAMETERS

Type	Bottom Rising High Temperature Vacuum Furnace	Top-opening high-temperature vacuum furnace
Effective working area of the furnace	Φ200×200mm | Φ400x400mm	Φ200×200mm
Heating element	Tungsten Mesh Heater	
Temperature uniformity	⩽±5℃	
Working vacuum	6.67×10^{-3}Pa	

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DEVICE

Laboratory Electric Furnace

01 | Box-type Furnace

02 | Box-type Atmosphere Furnace

03 | Tube Furnace

04 | Lift-Sintering Furnace

05 | Deflashing Furnace

PART 06

BOX-TYPE FURNACE

Box-Type Laboratory Electric Furnace employs resistance wire as its heating element and features an intelligent temperature control system with thyristor control, ensuring high temperature control precision. The furnace chamber is constructed with premium-quality alumina polycrystalline fiber inorganic material using vacuum adsorption molding technology from Japan. A dual-layer shell is equipped with an air cooling system, effectively maintaining a safe outer shell surface temperature.

Characteristics & Advantages

- The furnace chamber is made of premium-quality alumina polycrystalline fiber using vacuum adsorption molding technology from Japan. It exhibits low shrinkage, low thermal conductivity, excellent heat preservation, durability, and energy efficiency.
- The heating element is composed of silicon-carbon rods, capable of achieving a maximum heating temperature of 1400°C.
- Features over-temperature and thermocouple breakage protection alarms with power-off function, leakage protection, ensuring safe and reliable operations.

MAIN TECHNICAL PARAMETERS

Furnace chamber size	400×300×300mm
Maximum temperature	1400℃
Working temperature	⩽1300℃
Furnace temperature uniformity	±5℃
Heating method	Silicon carbon rod
Specification	1200℃-300×200×120mm 1400℃-400×300×300mm

PRODUCT

BOX-TYPE ATMOSPHERE FURNACE

This apparatus employs a 1900-type silicon-carbon rod as its heating element, showcasing an innovative dual-shell construction coupled with an intricately designed intelligent program-based temperature control system. The utilization of thermocouple control ensures an exceptional degree of precision in temperature regulation. The dual-layer furnace casing serves to effectively mitigate external shell surface temperatures. The consolidation of the control panel into an integrated structure underscores its compactness and rationality, all enveloped in a visually appealing exterior.

Characteristics & Advantages

- The heating mechanism harnesses the potential of a 1900-type silicon-carbon rod, meticulously arrayed around the periphery to guarantee unwavering temperature stability. This arrangement lends it exceptional longevity, enabling it to attain an impressive maximum heating temperature of 1800°C.
- Temperature modulation is orchestrated through a type B thermocouple, endowing the system with a remarkable temperature control precision of ±1°C, and ensuring that temperature homogeneity within the furnace cavity remains under the stringent threshold of ⩽1%. The positioning of the thermocouple at the heart of the thermal field exemplifies strategic precision.

MAIN TECHNICAL PARAMETERS

Specification	1800℃-400×300×300mm
Working Temperature	⩽1750℃
Heating method	Silicon molybdenum rod
Maximum temperature	1800℃
Furnace temperature uniformity	±5℃
Temperature control precision	(Constant temperature)±1℃
Temperature rise rate	Recommended⩽10℃/min The fastest heating rate is 30℃/min

TUBE FURNACE

The 1200-type tubular furnace integrates a resistance wire as its heating element, embodying an advanced dual-layer casing design and an intelligent program-based temperature control system. Featuring thyristor control, this system achieves an exemplary precision in temperature regulation. Within the dual-layer furnace casing, a supplementary air cooling system is strategically incorporated, effectively reducing surface temperatures of the furnace shell. Moreover, in tandem with our company's standardized vacuum and mixed gas systems, it permits both vacuum evacuation and gas circulation. The furnace cover is designed for quick opening, facilitating rapid cooling. All these elements culminate in a well-conceived structure and an aesthetically pleasing exterior.

Characteristics & Advantages

- The furnace chamber is constructed using imported polycrystalline alumina fiber material, renowned for its superior insulation properties, durability, high tensile strength, absence of impurities, elevated purity levels, and notably higher energy efficiency compared to domestic fiber materials.
- The furnace lid is designed to be opened, enabling real-time observation of the heated materials and facilitating rapid cooling to meet the experimental requirements of abrupt temperature changes.
- The heating element employs a resilient resistance wire, ensuring longevity and durability. It attains a maximum temperature of 1200°C.

MAIN TECHNICAL PARAMETERS

Working Temperature	≤1150℃
Heating method	Resistancewire
Furnace temperature uniformity	±5℃
Temperature control precision	（Constant temperature）±1℃
Temperature rise rate	Recommended ≤10℃/min, the fastest heating rate is 30℃/min
Type	Sliding tube furnace / Tilting tube furnace
Specification	1200℃-ϕ60*1000mm 1200℃-ϕ80*1000mm 1200℃-ϕ100*1000mm

PRODUCT

LIFT-SINTERING FURNACE

The core of the Lift-Sintering Furnace is designed in a gantry style, comprising several integral components: a resistive wire heating chamber, a material platform frame, a control cabinet, and a control system.

Characteristics & Advantages

- The furnace body is constructed with a frame made of square tubes and a shell crafted through precision sheet metal cutting, bending, and welding. Inside, there is a heating chamber and heating wires. The side panels of the furnace chamber are intricately assembled using oxide-aluminum polycrystalline fiber panels, while the top is designed with an optimized "A"-shaped inclined structure using the same material. The exterior is insulated with fiberboard and fiber blanket as thermal insulation layers. The furnace structure, uniquely designed by our company, is durable, resistant to collapsing, and offers exceptional insulation performance.
- The material platform frame is welded using square tubes and is vertically movable through linear bearings, in coordination with screw rods, optical axes, and motor drives. The placement platform serves as an external translating trolley for materials and is securely fastened to the main frame using screws. Equipped with guiding rails on its surface, it facilitates the movement of the translating trolley between the placement platform and the lifting material platform. The height of material placement is ergonomically designed to prevent fatigue during prolonged operations. The translating trolley, positioned beneath the heating furnace body, serves as both a lower furnace door and a platform for material placement.

MAIN TECHNICAL PARAMETERS

Maximum working temperature	1350℃
Temperature uniformity	≤±8℃
Temperature control precision	≤±1℃
Effective volume	530L
Empty furnace heating capacity	Below 1000℃, heating rate≥220℃/h 1000℃-1300℃, heating rate>120℃/h
Maximum loading capacity	800KG

PRODUCT

Deflashing Furnace

The deflashing furnace utilizes Kanthal heating wires as the heating element and incorporates an intelligent temperature control system with thyristor control for high precision temperature management. The furnace chamber is constructed with foam ceramics, while the double-layer furnace shell is equipped with a forced-air cooling system to effectively maintain a controlled surface temperature of the outer shell.

Characteristics & Advantages

- The furnace chamber is fabricated using foam ceramics, renowned for its minimal shrinkage, low thermal conductivity, exceptional insulation properties, enduring nature, and energy-saving attributes.
- The heating element is fashioned from Kanthal heating wires, capable of achieving an impressive maximum heating temperature of 1400℃.
- Employing a five-sided heating approach, the equipment ensures superior homogeneity in temperature distribution.
- Comprehensive safety features encompass over-temperature and thermocouple disconnection protection alerts, culminating in an automatic power disconnection mechanism, along with provisions for leakage current protection, amplifying operational safety and dependability.

MAIN TECHNICAL PARAMETERS

Furnace chamber size	400×400×400mm
Furnace temperature uniformity	±5℃
Working temperature	≤1300℃
Heating method	Resistance wire, five sided heating
Specification	1400℃-400×400×400mm