



Thermic Edge

Vacuum Heating Technology

FURNACE OVERVIEW



Address: Unit 2 & 3 Iberian Park, Drury Lane. TN38 9XP



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Overview

Features:

Thermic Edge supply a standard range of laboratory Vacuum Furnaces, heating up to 3000°C, into research institutes and universities for thermal processing, annealing, vacuum sintering and vacuum heat treatment in a high purity, clean environment.

Our Semi-Automatic Vacuum Furnaces allow the use of single or multiple gasses allowing processing from atmospheric pressure to high vacuum with either graphite, tungsten or SiC coated graphite hot zones all controlled via a simple one click HMI touchscreen display based on a small footprint, lightweight and moveable frame.

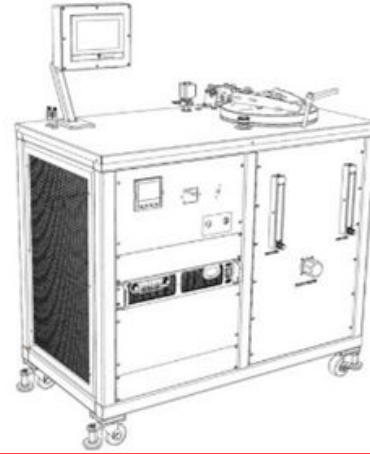


Available furnace options:

- Graphite crucible & wafer laboratory vacuum furnace
- Tungsten crucible & wafer laboratory vacuum furnace
- SiC coated graphite crucible & wafer laboratory vacuum furnace
- Graphite crucible & wafer benchtop vacuum furnace
- Tungsten crucible & wafer benchtop vacuum furnace
- SiC coated graphite crucible & wafer benchtop vacuum furnace

We also specialise in meeting the requirements of our customers with custom options for their system designed specifically for their needs and applications

Furnace Options

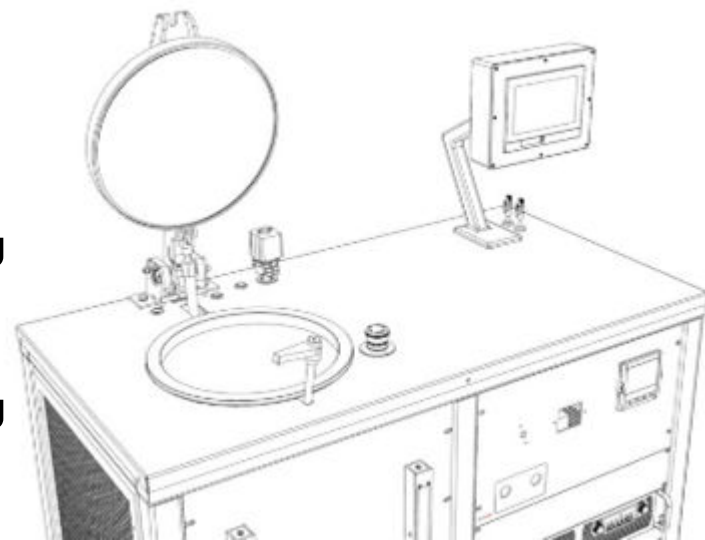


Crucible Furnaces (Crucible Sizes)

- 2000°C Medium Laboratory Vacuum Furnace with Graphite Hot Zone Crucible Furnace, 5kW DC PSU. Graphite and 1250°C SiC coated graphite Hot Zone – Ø60.5 x 75mm OR Ø102mm x 51mm
- 2000°C Large Laboratory Vacuum Furnace with Graphite Hot Zone and 1250°C SiC Coated Graphite Crucible Furnace, 15kW DC PSU. Graphite Hot Zone – Ø150 x 75mm
- 2000°C Extra Large Laboratory Vacuum Furnace with Graphite and 1250°C SiC Coated Graphite Hot Zone Crucible Furnace, 20kW DC PSU. Graphite Hot Zone – Ø80 x 140mm
- 2000°C Large Laboratory Vacuum Furnace with Tungsten Hot Zone Crucible Furnace, 5kW DC PSU. Tungsten Hot Zone – Ø150 x 75mm
- 2000°C Extra Large Laboratory Vacuum Furnace with Tungsten Hot Zone Crucible Furnace, 20kW DC PSU. Graphite Hot Zone – Ø80 x 140mm

Wafer Heating (Wafer Sizes)

- 4" Graphite Hot Zone, 5kW DC PSU
- 4" SiC Coated Graphite Hot Zone, 5kW DC PSU
- 4" Tungsten Hot Zone, 5kW DC PSU
- 6" Graphite Hot Zone, 10kW DC PSU
- 6" SiC Coated Graphite Hot Zone, 10kW DC PSU
- 6" Tungsten Hot Zone, 10kW DC PSU
- 8" Graphite Hot Zone, 15kW DC PSU
- 8" SiC Coated Graphite Hot Zone, 15kW DC PSU
- 8" Tungsten Hot Zone, 15kW DC PSU



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Benchtop Furnaces (Crucible & Wafer Sizes)

- 2000°C Graphite / 1250°C SiC Coated Crucible Furnace 1.5kW DC PSU – Ø20 x 30mm, Ø30 x 40mm, Ø40 x 50mm
- 3000°C Graphite Crucible Furnace 6kW DC PSU – Ø20 x 30mm, Ø30 x 40mm, Ø40 x 50mm
- 2000°C Graphite / 1250°C SiC Coated Wafer Furnace 1.5kW DC PSU – 1", 2" & 3"
- 2000°C Tungsten Wafer Furnace 3kW DC PSU – 1", 2" & 3"

Graphite Furnaces

Thermic Edge supply a standard range of laboratory Vacuum Furnaces, heating up to 3000°C, into research institutes and universities for thermal processing, annealing, vacuum sintering and vacuum heat treatment in a high purity, clean environment.



Our Semi-Automatic Vacuum Furnaces allow the use of single or multiple gasses allowing processing from atmospheric pressure to high vacuum with either graphite or tungsten hot zones all controlled via a simple one click HMI touchscreen display based on a small footprint, lightweight and moveable frame.

Available furnace options:

- Graphite crucible & wafer laboratory vacuum furnace
- Tungsten crucible & wafer laboratory vacuum furnace
- SiC coated graphite crucible & wafer laboratory vacuum furnace
- Graphite crucible & wafer benchtop vacuum furnace
- Tungsten crucible & wafer benchtop vacuum furnace
- SiC coated graphite crucible & wafer benchtop vacuum furnace

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Vacuum Furnaces

Key Features:

- Temperatures up to 2100°C
- Base pressure $<5 \times 10^{-2}$ mBar
- Automatic pump purge sequence to remove residual Oxygen
- Ramp rate $\approx 60^\circ\text{C}/\text{min}$ (Can be faster with bigger power supply)
- Processing in vacuum & atmospheric pressure
- Laptop PC for full data logging and multi-step programmable thermal process control
- Top loading furnace chamber
- Fully Water-cooled furnace, stainless steel chamber and lid
- Electrically driven lid with interlock sensors
- Crucible & wafer / flat sample heating
- Simple & safe operation with full protection interlocks, ideal for Universities or inexperienced operators
- Fully interlocked system providing safety for both user and system
- Semi-Automatic control via HMI Touchscreen
- Colour display combined Micro Pirani/piezo vacuum gauge
- Light weight DC switch mode power supplies (no bulky transformers)
- DC power supply controlled via Eurotherm Nanodac
- High performance and responsive control
- Manual pressure and gas flow rate regulation with automatic over pressure release valve
- Compact design, lightweight & small footprint, but large hot zones

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Options

- Diffusion High Vacuum Pump (Ultimate Vacuum 5×10^{-7} mBar)
- Turbo Pump (Ultimate Vacuum 5×10^{-8} mBar)
- Additional process gas options
- 3000°C all graphite hot zone
- 1250°C SiC Coated hot zone with bubble alumina felt for oxidising/corrosive environments
- Pyrometer – Auto change over
- Water chiller
- Hot zone thermocouples
- Oxygen compatible to 1400°C with SiC coated graphite hot zone and alumina insulation.

Water Sample Hot Zones

For wafer sample testing our laboratory vacuum furnaces use a CCC element enclosed in a graphite hot zone to heat both individual large Dia. samples and smaller samples held in a susceptor plate. Wafer sample furnaces range from 4" to 8" Dia sample size, with dual zone option on 8".

System Operations & Functions

- 3000°C laboratory furnace uses the same footprint as the standard furnace but incorporates a few changes.
- All graphite hot zone.
- Above 2100°C requires processing in an inert environment at atmospheric pressure.
- Processing can be achieved in oxidising environment up to 1250°C and 1400°C for short amounts of time with SiC coated graphite hot zone where graphite hot zones can only reach 400°C.
- Larger power supplies required whilst still fitting into a standard frame.
- Use of pyrometer for high temperature measurement with auto changeover

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Thermic Edge's range of laboratory vacuum furnaces provide a user-friendly interface promoting their ease of use via modern touchscreen HMI display which allows control of all furnace pumping, gas processing and venting features. With multiple screens for operation, interlock displays and mimic with valve states.

The HMI allows the user to control the automated pump down sequence which is designed to remove residual oxygen from the chamber and intern increasing the life of the hot zone and avoiding the possibility of oxidation occurring.

Two independent gas inputs are also controlled via the arm mounted HMI with their individual flows manually adjusted, via needle valves, to the user's requirements. Pumping speeds are also regulated manually via a vacuum Speedi valve mounted on the front of the vacuum furnace, enabling manual control of chamber pressure and gas flow rates. Temperature and datalogging are

controlled via a Eurotherm Nanodac PID temperature controller / data logger which can be connected to a remote PC for data analysis. Software is provided to allow for multi-step process cycles to be programmed allowing for simple repeat testing and easy adjustment to programs.

The fully water-cooled vacuum chamber and power feedthroughs keep the exterior of the chamber at ambient temperature and preventing overheating, allowing for extended periods of operation.

The fully water-cooled vacuum chamber and power feedthroughs keep the exterior of the chamber at ambient temperature and preventing overheating, allowing for extended periods of operation.



Service Requirements

All laboratory vacuum furnaces require an electrical supply, chilled water supply and drain, Argon gas for venting, process gas supplies and exhaust line.

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Services Specification

- Total Supply Power : 6kva, 415v 3 phase
- Water Connections: – 3/4" BSPT threaded ends to both flow and return.
- Flow rate min: 6 litres / min of water @ ambient temperature
- Process gas inlet: 1/4 Swagelok line with VCR Swagelok valve
- Vent inlet: 1/4 Swagelok line with VCR Swagelok valve.
- For Pneumatics (if fitted) – 60 – 80 psi. compressed air – 6mm push fit.
- N2/ Ar supply for venting/processing – <40 psi – 1/4" Swagelok fitting
- Pumping port size: 2.75" CF – KF25 adapter
- System height (lid closed): 1140mm
- System width: 1120mm
- System depth: 720mm (Measured from rotameter knobs to water supply pipes)

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Tungsten Furnaces

Thermic Edge supply a standard range of laboratory Vacuum Furnaces, heating up to 3000°C, into research institutes and universities for thermal processing, annealing, vacuum sintering and vacuum heat treatment in a high purity, clean environment.

Our Semi-Automatic Vacuum Furnaces allow the use of single or multiple gasses allowing processing from atmospheric pressure to high vacuum with either graphite, SiC Coated graphite and tungsten hot zones all controlled via a simple one click HMI touchscreen display based on a small footprint, lightweight and moveable frame.



Available furnace options:

- Graphite crucible & wafer laboratory vacuum furnace
- Tungsten crucible & wafer laboratory vacuum furnace
- SiC coated graphite crucible & wafer laboratory vacuum furnace
- Graphite crucible & wafer benchtop vacuum furnace
- Tungsten crucible & wafer benchtop vacuum furnace
- SiC coated graphite crucible & wafer benchtop vacuum furnace

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Vacuum Furnaces

Key Features

- Temperatures up to 2600°C
- Base pressure $<5 \times 10^{-2}$ mBar
- Automatic pump purge sequence to remove residual Oxygen
- Ramp rate $\approx 120^\circ\text{C}/\text{min}$
- Processing in vacuum & atmospheric pressure
- Laptop PC for full data logging and multi-step programmable thermal process control
- Top-loading furnace chamber
- Fully water-cooled furnace, stainless steel chamber and lid
- Electrically driven lid with interlock sensors
- Crucible & wafer / flat sample heating
- Simple & safe operation with full protection interlocks, ideal for Universities or inexperienced operators
- Fully interlocked system providing safety for both user and system
- Semi-automatic control via HMI Touchscreen
- Colour display combined Micro Pirani/piezo gauge
- Light-weight DC switch mode power supplies (no bulky transformers)
- DC power supply controlled via Eurotherm Nanodac
- High performance and responsive control
- Manual pressure and gas flow rate regulation with automatic over-pressure release valve
- Compact design, lightweight & small footprint, but large hot zones

Options

- Diffusion High Vacuum Pump (Ultimate Vacuum 5×10^{-7} mBar)
- Additional process gas options
- Turbo Pump (Ultimate Vacuum 5×10^{-8} mBar)s
- Pyrometer – Auto change-over
- Water chiller
- Hot zone thermocouples

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Hot Zones

The Tungsten Laboratory Vacuum furnaces are available with either crucible or wafer sample heating. For wafer sample heating a simple flat element is housed in a Tungsten body with radial heat shielding. For crucible heating the hot zone is heated using a Tungsten Mesh element with heat shield provided by Tungsten foil sheets.

System Operations & Functions

- 3000°C laboratory furnace uses the same footprint as the standard furnace but incorporates a few changes.
- All graphite hot zone.
- Above 2100°C requires processing in an inert environment at atmospheric pressure.
- Larger power supplies required whilst still fitting into a standard frame.
- Use of pyrometer for high temperature measurement with auto changeover

Thermic Edge's range of laboratory vacuum furnaces provide a user-friendly interface promoting their ease of use via modern touchscreen HMI display which allows control of all furnace pumping, gas processing and venting features. With multiple screens for operation, interlock displays and mimic with valve states.

The HMI allows the user to control the automated pump down sequence which is designed to remove residual oxygen from the chamber and intern increasing the life of the hot zone and avoiding the possibility of oxidation occurring.

Two independent gas inputs are also controlled via the arm mounted HMI with their individual flows manually adjusted, via needle valves, to the user's requirements. Pumping speeds are also regulated manually via a vacuum Speedi valve mounted on the front of the vacuum furnace, enabling manual control of chamber pressure and gas flow rates.

Temperature and datalogging are controlled via a Eurotherm Nanodac PID temperature controller / data logger which can be connected to a remote PC for data analysis. Software is provided to allow for multi-step process cycles to be programmed allowing for simple repeat testing and easy adjustment to programs.

The fully water-cooled vacuum chamber and power feedthroughs keep the exterior of the chamber at ambient temperature and preventing overheating, allowing for extended periods of operation.

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Service Requirements

All laboratory vacuum furnaces require an electrical supply, chilled water supply and drain, Argon gas for venting, process gas supplies and exhaust line.

Services Specification

- Total Supply Power : 6kva, 415v 3 phase
- Water Connections: – 3/4” BSPT threaded ends to both flow and return.
- Flow rate min: 6 litres / min of water @ ambient temperature
- Process gas inlet: 1/4 Swagelok line with VCR Swagelok valve
- Vent inlet: 1/4 Swagelok line with VCR Swagelok valve.
- For Pneumatics (if fitted) – 60 – 80 psi. compressed air – 6mm push fit.
- N2/ Ar supply for venting/processing – <40 psi – 1/4” Swagelok fitting
- Pumping port size: 2.75” CF – KF25 adapter
- System height (lid closed): 1 140mm
- System width: 1 120mm
- System depth: 720mm (Measured from rotameter knobs to water supply pipes)

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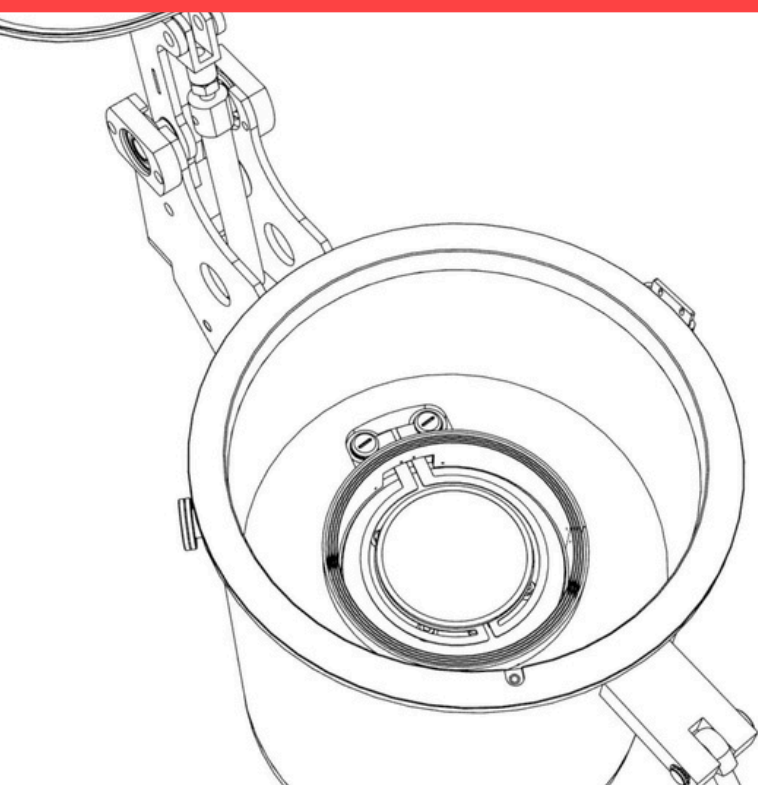
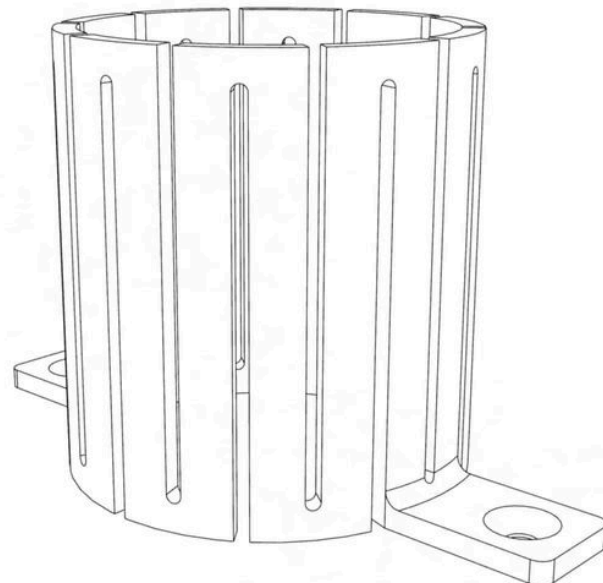


Thermic Edge
Vacuum Heating Technology

Benchtop Furnaces

The 2000°C Benchtop Vacuum Furnace provides a high-performance cost-effective solution to smaller sample size heating. Our standard benchtop vacuum furnace will heat a sample wafer or a crucible up to 2000°C. We also offer a 3000 °C version as a special option.

Thermic Edge supply a range of Benchtop Furnaces for use in smaller laboratories for the use on small sample testing, thermal processing, vacuum sintering and heat treatment in an extremely high purity and clean environment



The Benchtop offers a small footprint, light weight unit with simple one touch control via HMI touchscreen display with integrated power supply, rotary pump and manual flow control. Temperature control and datalogging is performed via a Eurotherm Nanodac controller with option for remote PC control and data analysis

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Vacuum Furnaces

Key Features

- Temperatures up to 2000°C
- Ramp rate \approx 100°C/min
- Base pressure $< 5 \times 10^{-2}$ mBar
- Automatic pump purge sequence to remove residual Oxygen
- Ramp rate \approx 60°C/min (Can be faster with bigger power supply)
- Processing in vacuum & atmospheric pressure
- Top-loading furnace chamber
- Fully Water-cooled furnace, stainless steel chamber and lid
- Electrically driven lid with interlock sensors
- Crucible & wafer / flat sample heating
- Simple & safe operation with full protection interlocks, ideal for Universities or inexperienced operators
- Fully interlocked system providing safety for both user and system
- Semi-automatic control via HMI Touchscreen
- Lightweight DC switch mode power supplies (no bulky transformers)
- DC power supply controlled via Eurotherm Nanodac
- High performance and responsive control
- Manual pressure and gas flow rate regulation with automatic over-pressure release valve
- Compact design, lightweight & small footprint options

Options

- Turbo Pump (Ultimate Vacuum 5×10^{-8} mBar)
- Additional process gas options
- Laptop PC for full data logging and multi-step programmable thermal process control
- Pyrometer – Auto change over
- Water chiller
- Hot zone thermocouples
- Oxygen compatible to 1400c with SiC coated graphite hot zone and alumina insulation

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Gas Processing

The Benchtop Furnace offers flexibility in its process gas options using the Gas Supply Box to allow multiple gasses to be connected and only a single gas supplied into the rear of the furnace. The chamber has a single gas supply into the hot zone with a manual flow control but using the Gas Supply Box the user can switch between different process gasses during their heating process all controlled by the HMI touchscreen.

Service Requirements

All Benchtop laboratory vacuum furnaces require an electrical supply, chilled water supply and drain, Argon gas for venting, process gas supplies and exhaust line.

Services Specification

- Total Supply Power : 2.0kva, 220v single phase 13A
- Water Connections: – 3/4" BSPT threaded ends to both flow and return.
- Flow rate min: 6 litres / min of water @ ambient temperature
- Process gas inlet: 1/4 Swagelok line with VCR Swagelok valve
- Vent inlet: 1/4 Swagelok line with VCR Swagelok valve.
- For Pneumatics (if fitted) – 60 – 80 psi. compressed air – 6mm push fit.
- N2/ Ar supply for venting/processing – <40 psi – 1/4" Swagelok fitting
- Pumping port size: 2.75" CF – KF25 adapter

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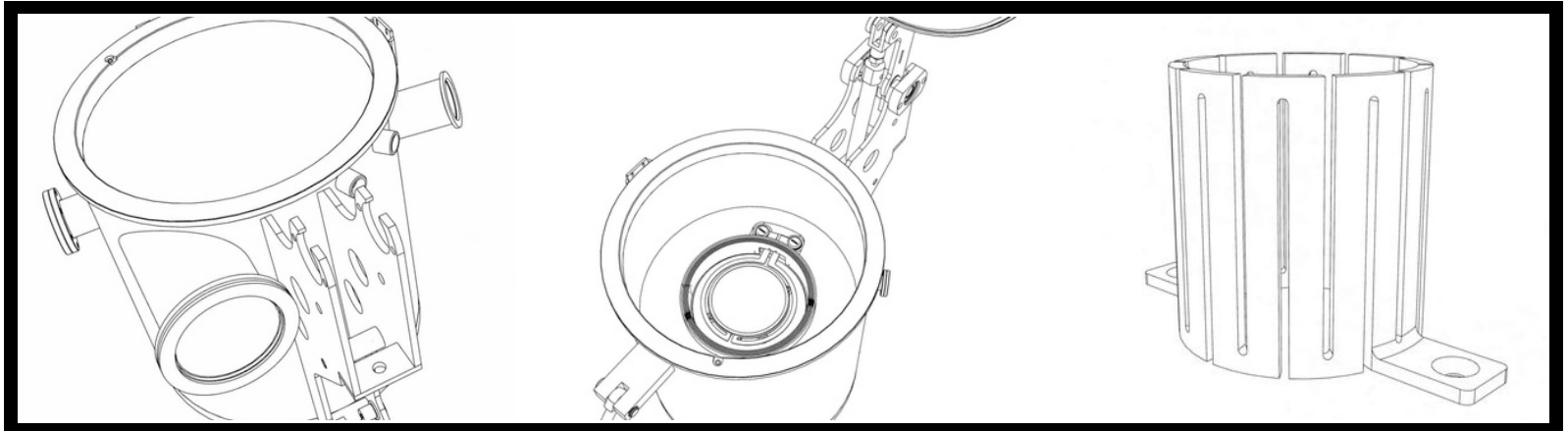
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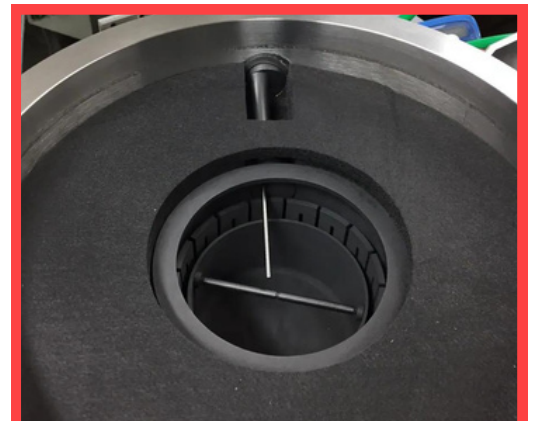
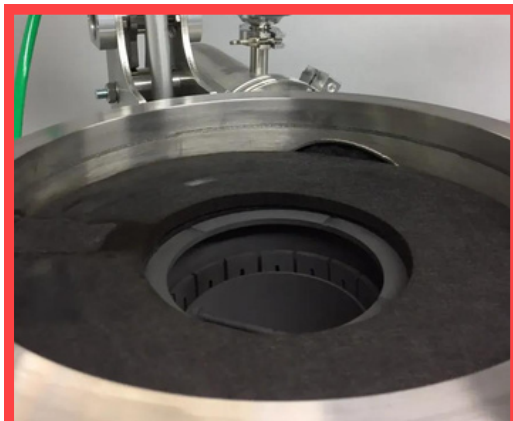


Additional Options and Customisation

Custom Hot Zones & Chambers



All our vacuum furnaces are customisable allowing us to cater to the needs of our customers and their exact requirements. We can do this by adjusting the hot zones from our standard sizes to include dual hot zones or cater to hold a specific size sample. We can also customise the water-cooled chamber by adding ports to allow for extra data analysis in the form of extra hot zone thermocouples, internal crucible thermocouples, residual gas analysers (RGA's), pyrometers and more.



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Pumping Options

The standard laboratory vacuum furnace is fitted with an Edwards RV8 vacuum pump allowing the system to pump down to a rough vacuum of 5×10^{-2} mBar on a well condition system.

For systems that require higher vacuum, we have two of the following options:

Option 1

- Oil Diffusion
- Cold trap
- Pneumatically driven butterfly valve
- High pressure, colour display, vacuum gauge with automatic pump change over set point
- Ultimate pressure 5×10^{-7} mBar

Option 2

- Turbo pump
- Automatic control bellows valves
- Pneumatically driven butterfly valve
- High-pressure colour displays vacuum gauge with automatic pump change over set point
- Ultimate pressure 5×10^{-8} mBar

Gas Supply Options

Our standard laboratory vacuum furnace offers two gas supplies in the chamber allowing the use of a vent gas, into the top of the chamber, and also a process gas feeding directly into the hot zone. Both gas flows are manually controlled with flow meters mounted on the front of the chamber and typically Argon is used for the pump-down procedure and venting whilst other gases can be used for processing.

Our Benchtop furnace uses a single gas input into the hot zone acting as both vent gas and process gas with the flow also manually controlled.

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To offer a variety of gasses to be fed into the 'process gas' line of the laboratory vacuum furnace and the single supply on the benchtop furnace we offer a Gas Supply Box which allows for multiple gasses to be connected and only a single gas supplied into the rear of the furnace. Still using the manual flow control on each furnace, the Gas Supply Box allows the user to switch between different process gasses during their heating process all controlled by the HMI touchscreen.

