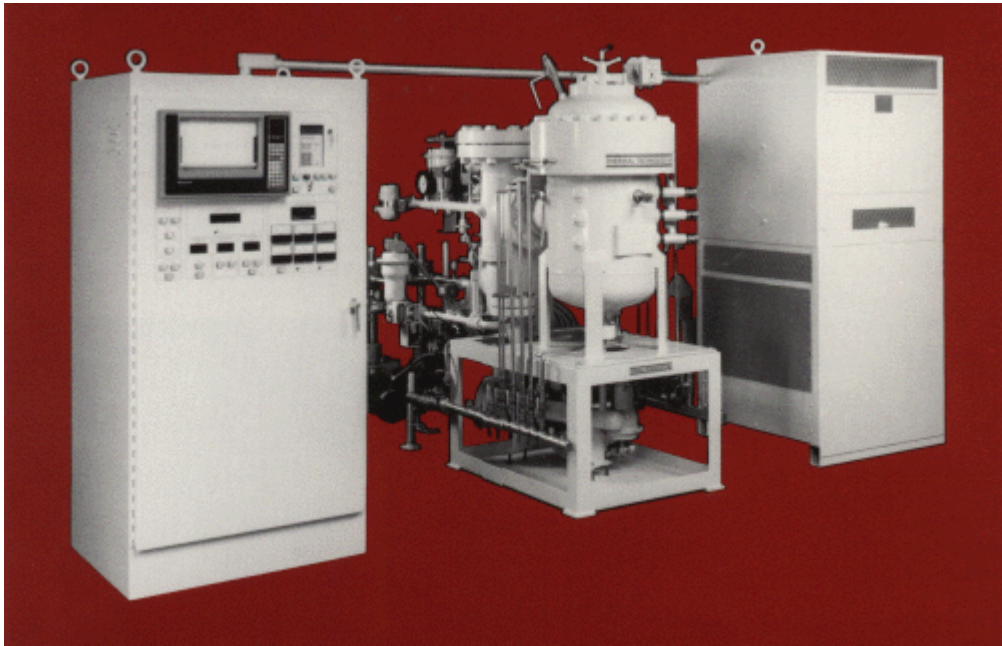


PRESSUREMASTER

VACUUM/ISOSTATIC PRESSURE FURNACES
FOR DENSIFICATION OF POWDERED CERAMICS
CERMETS AND METALS



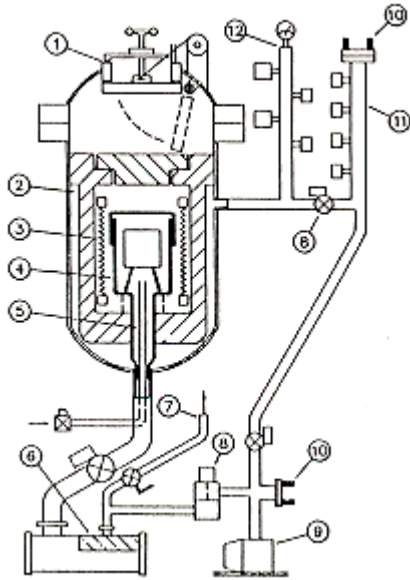
GENERAL DESCRIPTION

Pressuremaster furnaces are designed for high temperature powder processing under vacuum or isostatic gas pressures. This wide range of pressure control enables consolidation of binder removal, sintering, and high pressure compaction into a single run.

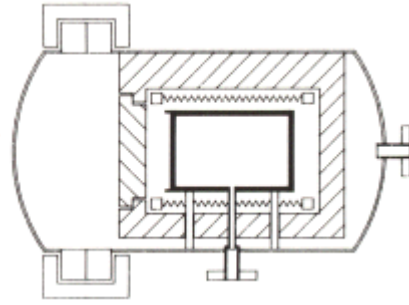
Each Pressuremaster is supplied as a complete system including: pressure vessel, graphite heat zone, power supply, mechanical vacuum pump, and a programmable control system. Optional accessories for binder removal under a variety of conditions are available to meet individual needs.

1. High pressure closure
2. Furnace insulation
3. Heater
4. Retort*
5. Injector*
6. Collector system*
7. Direct vent
8. Pressure locking valve
9. Mechanical pump
10. Release disk
11. Low pressure manifold
12. High pressure manifold

* Optional items



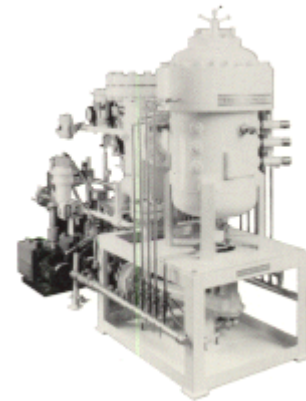
Model 612



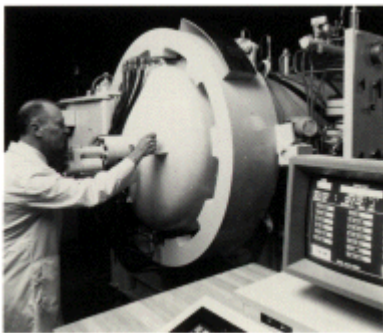
Model 1824

CHAMBER AND HEAT ZONE

Standard Pressuremaster furnaces are built with pressure vessels rated to 40 bar in accordance with ASME Codes. Optional 100 bar ratings are also available. Convenient load access ports are provided on all chambers to avoid time consuming bolting and unbolting of high pressure flanges. Model 612 utilizes a manually operated swing down access door. Model 1218 uses an air operated locking mechanism. Models 1624 and 1824 use hydraulic locking rings.



Model 612



Model 1824

Graphite heat zones are used to provide 2200° C operating temperatures in the Pressuremaster. Smaller power supplies can be provided for customers processing powdered metals below 1600° C. Each heat zone is heavily insulated with fibrous graphite insulation. Penetrations are minimized and are located in the lower half of the heat zone to reduce thermally driven bottom-to-top convection currents. All models, except for the laboratory size Model 612, are provided with individually adjusted top and bottom heating elements for improved temperature uniformity.

PRESSUREMASTER

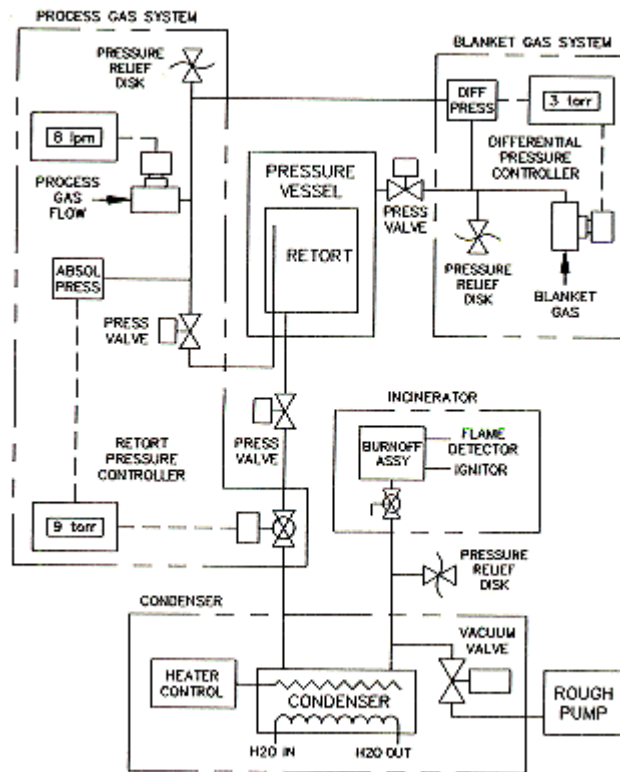
| Work zone (inches) | Loading | Work volume (cubic ft) | Hearth capacity (lbs.) | Power supply (kVA) | Vacuum pump (cfm) | Pressure rating standard/optional (bar) | Relative price | MODEL NUMBER |
|--------------------|---------|------------------------|------------------------|--------------------|-------------------|---|----------------|--------------|
| 5 Ø by 10 | Top | 0.1 | 10 | 60 | 16 | 40/100 | 1.0 | 612 |
| 10 Ø by 12 | Top | 0.6 | 50 | 100 | 27 | 40/100 | 1.5 | 1218 |
| 13 Ø by 18 | Front | 1.4 | 150 | 160 | 50 | 40/100 | 1.8 | 1624 |
| 18 Ø by | Front | 3.5 | 350 | 250 | 90 | 40/100 | 2.2 | 1824 |

Binder Removal Accessory

Binders can be removed in the Pressuremaster under vacuum, inert, reducing or oxidizing atmospheres. The choice of atmosphere for binder removal will determine which of the following optional accessory packages are required.

Vacuum

Vacuum binder removal is done with a graphite retort to contain volatilized vapors and direct them to the pumping system. A condenser is required to collect condensable effluents before they reach the vacuum pump. The "blanket gas" control system will maintain relatively high pressures outside the retort, minimizing the escape of volatiles. The process gas system controls retort internal pressure either by flowing inert gas through the workload (upstream control) or by varying vacuum system conductance (downstream control). An incinerator may be required (on the vacuum pump exhaust) if non-condensable organics are present.



Inert

A graphite retort and incinerator are normally used for binder removal with slight positive pressures of inert gas. Condensers are occasionally provided for combustible organics to minimize combustion by-products. High pressure operation to 100 bar for condenser and gas supply systems can also be provided.

Reducing

A graphite retort, incinerator, and combustible gas safety system are required when explosive concentrations of combustible gases are present.

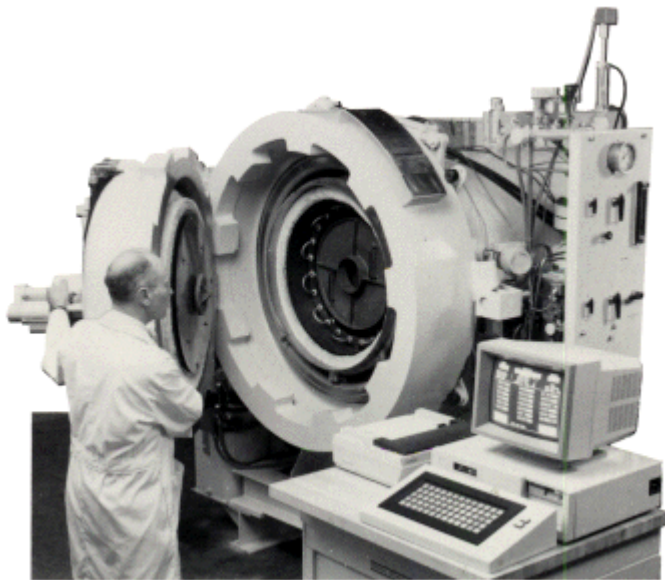
Oxidizing

The Pressuremaster can be supplied with a ceramic heat zone for binder removal in flowing high pressure air. An inconel retort is used, limiting maximum temperature to 900° C (not suitable for high temperature sintering).

SPECIAL FEATURES

Standard

- Extensive safety features including pressure relief disks on low pressure manifolding, electronic interlocks, self



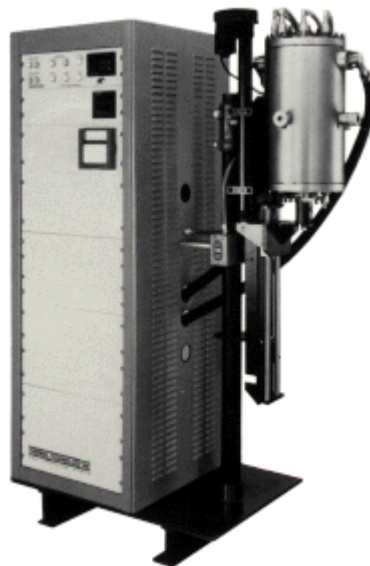
- locking valves, and ASME Code stamped pressure vessel.
- Rapid access load port
- Trimmable top and bottom heaters for improved temperature uniformity (Models 1218, 1624 and 1824).
- Low conductivity insulation of non-convective construction.
- Top to bottom convection currents blocked by strategic location of power feedthroughs (lower half of heat zone only).

Optional

- Full range of binder handling accessories.
- Ceramic/nickel heat zone for oxidizing atmospheres.
- Internal retort for binder containment.
- Retort cover actuator for fast cooldown.
- High capacity condensing system for injection molded components.

Custom Designed Vacuum/Isostatic Pressure Furnaces

When specialized load size, heat zone construction, or process instrumentation are required, Thermal Technology's engineers can design a custom furnace system to meet your exact requirements. Our experienced staff will ensure that your process requirements are met while still providing the reliability, ease of maintenance, and extensive safety provisions for which our equipment is known.



Laboratory-sized pressure furnaces are available for use in inert atmospheres to 3000° C. The furnace may be operated in either vertical or horizontal orientations.

PRESSUREMASTER Installation Data

| Model Number | Layout ¹ WxDxH (feet) | Electrical ² 460V, 3ø, 60Hz (kVA) | Water ^{2,3} (gpm) | Air (psig) |
|--------------|--|--|-------------------------------|---------------|
| 612 | 7x7x6 | 70 | 12 | 75-100 |
| 1218 | 7x7x6 | 120 | 20 | 75-100 |
| 1624 | 8x9x6 | 180 | 32 | 75-100 |
| 1824 | 9x10x6 | 280 | 50 | 75-100 |

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

- Notes:
1. Exact dimensions depend on choice of accessories. These figures are minimums – but include furnace, power supply, control cabinet, and pumping system. Components may be arranged to different dimensions to suit individual requirements.
 2. Alternate power supplies, pumps, and fans may require different inputs.
 3. Water must be clean and free of contamination and minerals, regulated to 50 psig, and 70°C maximum temperature.

All specifications are subject to change. Final quotation will be the governing document in all cases.

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