Raising Hearth Furnace

Reliable | Uniform | Safe Heat Treatment Solution

The Raising Hearth Furnace is designed for efficient and uniform heat treatment with a vertically movable hearth mechanism. This design enables easy loading and unloading of samples, improves operator safety, and ensures consistent thermal performance for laboratory and industrial heat treatment applications.

Key Features

- Raising / lowering hearth mechanism for easy material handling
- Excellent temperature uniformity across the working chamber
- Robust refractory and high-efficiency insulation
- User-friendly PID / PLC based temperature control
- Customizable chamber size and load capacity

Technical Specifications

1	Furnace Type	Raising Hearth / Bottom Loading Furnace
2	Heating Zone Size	100 × 100 × 100 mm (W × D × H) for uniformity hot zone Accuracy at hot zone: ± 1°C or better
3	Usable Volume	~1 liter
4	Maximum Temperature	1500 °C
5	Working Temperature	1400 °C (continuous duty)

6.	Heating Elements	Silicon Carbide Heating Element
		
		1. General Description
		
		• Type: Non-metallic electrical resistance heating element
		• Material: High-purity recrystallized Silicon Carbide (SiC)
		
		2. Electrical Properties
		
		• Maximum Operating Temperature: Up to 1500 °C (in air)
		• Continuous Operating Temperature: 1400 °C
		• Resistivity: 0.02 – 0.08 Ω·cm at 1400 °C (increases with age due to oxidation)
		• Surface Load: 3 – 10 W/cm²
		• Voltage Range: Typically designed for 415 V systems
		• Power Range: From a 980 watts to several kW per element
		
		3. Mechanical Properties
		
		• Density: 2.6 – 2.8 g/cm*
		• Tensile Strength: ~100 MPa or better
		• Flexural Strength: ~200 MPa
		• Thermal Conductivity: 20 – 30 W/m·K at 1000 °C
		• Thermal Expansion Coefficient: ~4.5 × 10^{-6} /K
		4. Dimensional Range
		
		• Diameter: 18 mm
		• Length: 880 mm (hot zone + cold ends)
		• Hot Zone Length: 250 mm
		  ○ U-Shaped: Two heating legs connected by a bridge
		5. Operating Conditions
		
		• Atmosphere Compatibility:
		  ○ Oxidizing atmospheres: up to 1300 °C
		  ○ Inert / neutral atmospheres: up to 1350 °C
		  ○ Vacuum: up to 1400 °C (limited by oxidation during venting)

		• Heating Characteristics:
		  ○ Self-heating by electrical resistance
		  ○ Resistance increases gradually with service life (must be considered in design)
		  ○ Rapid heating rates possible (up to 20–30°C/min)
		6. Installation & Mounting
		
		• Mounted using alumina or refractory brick supports
		• Electrical connections through clamps made of copper with flexible braided cables
		• Cold ends coated with aluminum for reduced resistance and easy connection
		• Recommended spacing between elements: ≥ 1.5 times element diameter

7	Temperature Uniformity	± 1 °C within hot zone or better
8	Temperature Control	PID controller with programmable profiles Parameter Specification Product Type Touch-screen PID temperature controller & recorder Colour touch-screen HMI; with real-time trend Display / Interface curves, bar graph, history log; USB interface for data export. Panel Sizes 5-inch or higher Available Accuracy 0.1 % Full Scale (FS) measurement accuracy. Supported Input Thermocouples (various types), RTD (Pt100 Types etc.), voltage and current inputs, also custom/nonlinear calibration possible. Control Algorithm intelligent/adaptive PID; self-tuning; ramp/soak programs Multiple alarms: high/low, deviation, possibly Alarms more depending on model configuration; alarm logging available. Records temperature and other related data; Data Logging / trend curves, real-time bar graph & history; Recorder Function data can be downloaded over USB; Ethernet socket embedded for remote monitoring/control. Measurement & Dual CPU architecture: one CPU for SamplingHMI/data, another for real-time control/sampling.

		Four internal slots to allow alternate I/O / alarm / communication modules; can be Modules / Expandability: expanded when built-in modules are insufficient; also has expansion port to connect external I/O / PLC etc. Anti-Interference / Protection: Passed 4 kV / 5 kHz burst pulse test; good EMC / noise immunity. Power Supply: Standard mains power (likely 100-240 VAC 50/60 Hz or as per Indian spec) Power Consumption: Low, especially in standby; "low power consumption" is emphasized in the product description. Output Options: Relay, SSR drive, or advanced output control depending on configuration; likely single loop control with possible alarm / auxiliary outputs via modules. Environmental / Ambient: Should be Designed for industrial conditions; specified anti-interference, ruggedness; ambient temperature/humidity
10	Ramp rate	0.1 – 20 °C/min or higher
11	Hearth Movement	Motorized screw lift system (Variation Free) Parameter: Description: Typical / Example Values: Actuator Mechanism by Type: which motion is produced: brushless motor drive Voltage / Power: Operating voltage and any options: 12 V DC Supply Stroke Length (Travel): Maximum linear motion from fully retracted to fully extended: 50–400 mm typical; custom strokes possible Push (Thrust): Maximum force while extending under loaded conditions: 6000 N or higher Force Maximum force while retracting (may be same or lower than push): Slightly lower than push in Pull Force many actuators; e.g. 4500 N vs 6000 N in some models How fast the actuator moves Speed: speed of 0-20 mm/s, rated-load speed lower under no-load and under full load

		Fraction of time Duty Cycle actuator can be active vs resting to avoid overheating Switches to stop automatically 10%, for powerful/industrial versions Limit motion at end of stroke Adjustable Switches Self-Lock / Holding Force when extended How much load it can hold without powered drive must be held without motor current Often equals pull force or a fraction; important if load Noise Level during operation Sound output ≦ 50-55 dB (unloaded) Protection / Resistance to dust, water ingress, etc. IPx4, IPx5, sometimes IP54, optionally higher Rating (IP65 etc.) depending on Sealing (IP environment Operating Temperature range Ambient work temperature e.g. −10 °C to +60 °C; sometimes wider for industrial use (e.g. −25 to +65 °C) Material & Construction Housing, rod, screw materials; stainless steel rod; n bearings; finish corrosion/wear resistant coatings; Aluminum housing, steel or guides/sliders Mounting End attachments, Clevis / bracket mounts, eye pivot points, / fork ends, pivot holes etc.; mounting holes must include mount hole diameter & geometry Feedback How position or travel is controlled / sensed Limit switches, optional Control / end-of-Hall sensors, potentiometer, encoder feedback in some models Electrical Current Draw Current needed at no-load and under full load Depends on motor & load; example: 6 A under full load, lower when unloaded Speed vs load Lifetime / Expected service life (mechanical How speed falls good Load Curve with increasing important for selecting correct actuator Provided in datasheets; Often >10,000 cycles; Number of depends on environment, Cycles wear) duty cycle, lubrication etc. Certification CE, RoHS, EN / IEC Safety, EMC, standards; for medical ns / medical, etc. actuators additional Standards approvals like EN 60601 etc.
12	Hearth Load Capacity	2–5 kg
13	Atmosphere	Ambient air (optional: Inert gas purging, N_2 / Ar)
14	Insulation	High-grade ceramic fiber + alumina refractory
15	Thermocouple	Type R or better
16	Safety features	Over temperature cut off, hearth interlock Over-temperature cut-off, hearth interlock,

Applications

- Heat treatment of metals and alloys
- Sintering and annealing
- Material research and development
- Laboratory and pilot-scale processing