

**THERMAL SHOCK TEST CHAMBER (THREE ZONE)**



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Plot no. 38 , Kh No 52/5 , Nangli Poona Village , Delhi-110036 :





Hapten Biotechnology is a trusted manufacturer, supplier, and exporter of **3 Zone Thermal Shock Chambers in India**. Our **Air to Air Thermal Shock Test Chambers** are engineered to conduct highly accurate thermal shock testing by rapidly exposing products to extreme temperature variations.

Our **Three Zone Thermal Shock Test Chambers** consist of separately controlled hot, ambient, and cold zones, ensuring precise simulation of harsh environmental conditions. During testing, products are transferred between these zones to evaluate material durability, failure points, and thermal expansion behavior. These Thermal Shock Test Chambers are widely used in electronics, automotive, aerospace, and material testing industries to ensure product reliability and longevity.

We offer **customized Air to Air Thermal Shock Test Chambers**, tailored to meet specific testing needs. Whether you require 2-zone or 3-zone configurations, our chambers provide programmable settings, rapid temperature recovery, and energy-efficient performance for optimal testing accuracy.

As a **leading manufacturer, suppliers and exporter in India**, Hapten Biotechnology ensures that each **Three Zone Thermal Shock Test Chamber** is built with high-quality materials and advanced technology for durability, precision, and compliance with international testing standards.

Upgrade your testing capabilities with our **3 Zone Thermal Shock Chambers**.

## SALIENT FEATURES:

- **Horizontal airflow design assures uniform results**
- **Temperature recorder provides 24 hour part temperature recording as the load travels from zone to zone.**
- **Smooth transfer of specimen**
- **Three levels of overheat protection and 2 levels of overcooled protection**
- **Microprocessor temperature/humidity programmer.**
- **Computer communications, networking, data-logging software.**
- **Colour touch panel.**

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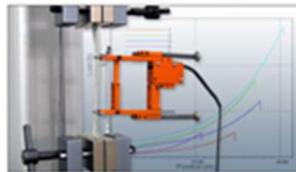


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- HMI+PLC in one unit
- Door open and Door close alarm system.
- Inbuilt calibration system.
- Separate Inbuilt printer for printing graphs(optional).



- **Less use of Electrical and Mechanical Components on the Top and Bottom of Chamber** - Provides easy maintenance of chamber, increases durability because of proper air circulation; cooling systems kept at bottom of the chamber to provide proper environment for compressor.
- **Full opening Door with Silicone Gaskets and Hinged on Left Side** - Allows ease of complete access to the chamber and opening of door with less force; durable silicon gasket reduces temperature loss.
- **Heated Viewing Window** - Heated viewing window allows viewing fog generated and proper viewing of the test sample.
- **Circulation Fan with Variable Speed** -
  - **Electrical efficiency** : Variable speed motor saves money by reducing energy bills, as it consumes less electricity than conventional motor.

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- **Cooling Efficiency:** Variable speed enables gaining air conditioning efficiency or SEER.
- **Air Quality :** Variable speed motor helps clean the air efficiently. When the fan is in constant operation (indicated by the "Fan" setting on thermostat), the motor continues to slowly circulate air, allowing filters to capture more contaminants.
- **Humidity Control :** Variable speed motor combined with a Thermostat allows controlling the amount of humidity.
- **Quieter Operation :** Variable speed blower motor are significantly quieter than its single-speed counterpart.
- **Air Cooled Refrigerated System -** Air cooled refrigeration system offer various benefits like
  - low fan power consumption
  - resistant to corrosion and freezing conditions
  - requires very low maintenance
  - Guaranteed long life operation
- **PCRC Sheet Body -** Powder coated steel body assures corrosion resistant chamber and allows working of chamber at high temperature applications.
- **Digital Output –** Target and Performance Output of the chamber operations are in digital format (digits) giving precise reading.
- **Pre - Attached Data Logger with Data Analysis Software -** Primary benefits of using data loggers is to automatically collect data 24-hour basis. Graph and table format of results can be produced automatically by the data logging software.
- **Self - Calibration System -** HAPTEN incorporate a self-calibration system, in each chamber, that is completely automatic to prevent errors that could result from failure to calibrate. The system continuously monitors the environment, sensing changes that could affect analysis, and re-calibrates accordingly using a built-in long-life calibrator The process takes just a few seconds, without operator intervention or additional supplies, quickly optimizing system parameters for the current conditions.

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- **Open and Close Updates Through Mobile Network** - Mobile technology has the potential to make services more flexible and keep informed, information anywhere at any time from mobile device, and can set alert system to know whether or not the chamber is being used.
- **Reliable** – Construction, performance mechanism, controls and information system integration makes the equipment reliable.
- **Precise Control of Environmental Parameters** - The set/ programmable parameters of the chamber are precise or have less deviation from original value, thus ensuring correct measurement.
- **Micro - Processor Based Controller** – Microprocessor based controller enables precise control of temperature, humidity, pressure and other values. **Benefits:**
  - Processing speed is high
  - Provides flexibility to alter the system by changing software.
  - Compact in size.
  - Operation and maintenance easier.
  - Maintain precise values
- 6. **Aesthetically designed** - Designed according to the standards and principles underlining industry's aesthetic values.
- 7. **Corrosion Resistant interior and exteriors** - Corrosion resistant coatings like epoxy coatings are applied inside and outside the chamber to prevent against degradation due to moisture, salt spray, oxidation or exposure to a variety of environmental or industrial chemicals/ corrosive agents.
- 8. **Energy Efficient** – our chamber uses less energy to provide the same level of performance, comfort and convenience, thus making it energy conserving chamber.
- 9. **CFC - free cooling** - The air cooled refrigerator use CFC (chlorofluorocarbon)-free refrigerants those are ozone friendly and eco-friendly.
- 10. **Sturdy Construction** - our chambers are built with robustness to withstand stress and strain, giving the chamber long life and ability to perform in extreme stress environments.
- 11. **Low Maintenance** - our systems benefit in retaining proper functionality over long period of time.
- 12. **Light Weight:** Compact and superior materials ensure the chamber be light weight

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## OPERATING PRINCIPLE:

In case of air to air chamber the heated air and cooled air are used **3 Zone:** Sample is placed in the test chamber at higher temperature than test temperature, in high-temperature chamber and low-temperature chamber. Rather than only hot and cold temperature the specimen flows between hot, ambient, and cold zones. When converted into high-temperature test, cold chamber and ambient chamber door is closed, hot chamber doors are opened, and test chamber works. When it comes to low temperature test, cold chamber door open, and low-temperature chamber works. When it comes to ambient chamber temperature test, ambient chamber door open, and ambient-temperature chamber works.

## CONSTRUCTION DETAILS :

Our Thermal Shock test chambers are double walled convection heated and cooled units. Outer body of our environmental chambers are constructed out of thick PCRC, pre coated corrosion resistant GI sheet duly pre-treated with primers and rust proofing and painted with long lasting stove enamel or elegantly powder coated. The inner chamber is made of heavy gauge stainless steel sheet of SS-304 grade). The gap between the walls is filled high grade mineral glass wool, which ensures maximum thermal efficiency in our chambers.

The unit is provided with single door, with viewing window made of thick flexi glass/float glass, to view the specimens, without disturbing the temperature of the chamber. This door is provided with magnetic door closer. This door is provided with lock and key arrangement. The unit is mounted on a sturdy steel frame. The unit is provided with various customized shelves in various permutations and combinations to suit individual requirements. The triple walled back of our Thermal Shock test chambers are provided with two/Four/Six/Eight (size specific) air circulation fans for uniform maintenance of the temperature throughout the chamber.

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## HMI+ PLC IN ONE UNIT:



We provides better automatic controls for the chamber by integrating HMI and PLC together. This special feature is compelling alternative to traditional methods and provides a simplified, reduced cost control system architecture. It works by following operating steps:

- Sensors measure the physical quantity like temperature and convert them to electrical signal
- The actuation device acts upon that electrical signal
- At HMI interface between operator and chamber occurs.
- The machine operates with the logic design controls controlled by software.
- This signal is sent to the chamber by logic control devices and the chamber operates.

## Basic features of HMI+PLC:

- **Processor of 1.6 GHz:** High clock speed processing PLC that enables speed up processing to the functions. With 1.6GHz processing speed, the PLC system is capable of multitasking, processing of large data volume, and high performance.
- **Audio Output Alarm:** Audio alarm alert in case of failures in any of the component controlling functions.
- **256 MB of RAM:** PLC of 256Mega Byte memory for running programs offers high memory space for installing of more programs
- **COM Port:** Com port provided for attaching RS 235/RS 485 cable.



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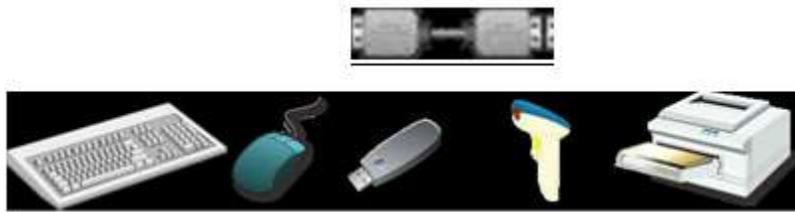
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- **USB Ports:** A USB port provided for transferring data through communication between HMI and PLC. Various peripherals can be connected via USB hub.



- **Colour Touch Panel:** We provide colour touch panel screen available in 2 sizes -7 inches and 10inches, displaying all the control features, digital clock, sensor layouts, data and values, graphics and pictures, navigations etc.
- **RS232 or RS485 Interface:** Serial interface provided to get connectivity with internet, mobile and other data transmission. Single device to device interface and a communication bus that is used to form simple networks of multiple devices are available through RS485 interface. RS485 interface supports transmission speed of 2400, 4800, 9600, 19200, 38400 bits per second.

Through Ethernet communication module, AC Drives, temperature controller and other industrial automation products can be connected quickly.

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(AC Servo Drive)

(Temperature Controller) (VFD- Vehicle Force Drive)

- **Touch Screen Size of 7 Inches and 10 Inches:** HMI screen available in 2 sizes- 7inches and 10inches, as per user's requirement. Screen displays the control features, images, data values and other programs.
- **Expandable Memory with a SD Card:** SD card plugged in appropriate slot for more memory requirement that will be read and used as part of device; for long storage requirements SD card may be added and store data with expanded memory.



- **High Resolution Brilliant TFT Displays, 64k Colours:** HMI screen displays 64000 different colours with good resolution, allowing large number of distinguished colours, easy to establish and work with. It shows entire new 2D drawing technique, the screen resolution enhanced for more realistic images and more colourful and vivid displays.

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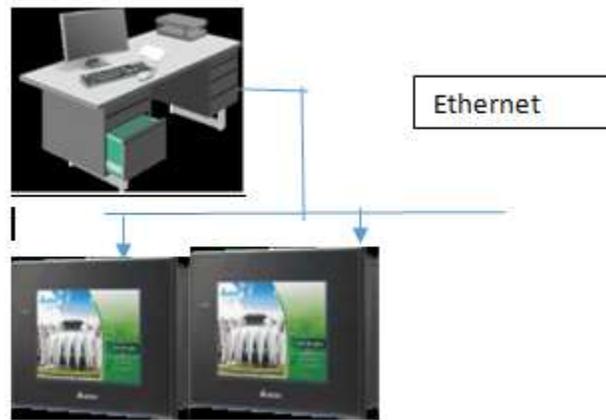


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- **Software Supports All Six IEC 61131 Programming Languages:** Software supports all the six programming languages under international standard IEC 61131: Function Block Diagram, Ladder Diagram, Structured Text, Sequential Function Chart, Instruction List, and Continuous Function Chart.
- **E-remote Control Software:** E-remote enables viewing the monitor and same screen shown on HMI at the production site, and control the manufacturing process via Ethernet.



- **A set of Trouble Shooting Tools:** 3 troubleshooting tools provided with in the software
- Simulation- Imitation of a situation as real situation
- Debugging- Finding and reducing number of defects.
- Online changes- Like change of IP address can be made online. Manual to operate the programs on request.

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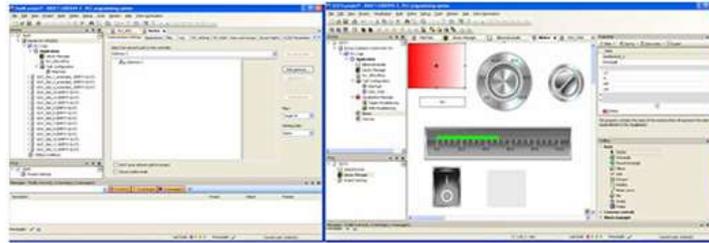


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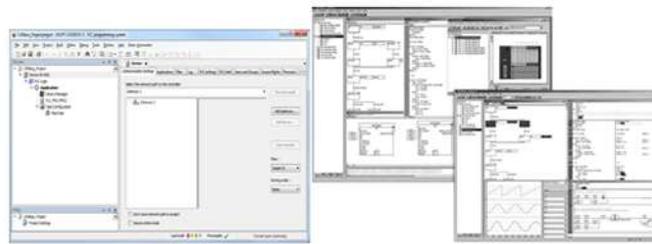


- **Increased Numbers of On - Board I/O peripherals (10-50):** Maximum number of 50 I/O peripherals provided on request, to attach input and output devices to the HMI and PLC. Increased number of input and output peripherals allows adding of devices like printers, recorders, etc., as per the need.
- **Data Logging and Free Programing Software:** Attached data logger with input program software provided. Through data logging software, HMI and PLC collect data through sensors, analyze the data and save and output the results of the collection and analysis. Examples of the types of information a data logging system can collect include temperatures, sound frequencies, vibrations, times, light intensities, electrical currents, pressure and changes in states of matter.

#### CoDeSys (Controller Development System) software technology



Software Screen Shot



- **Heating:**

Indirect heating system is provided in our units, comprising of air heaters made of high grade Kanthal A-1 wires of suitable wattage. The warm air is evenly distributed throughout the chamber through efficient motor fans ensuring very good temperature sensitivity.

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- **Cooling:**

An energy efficient cooling unit is installed in our photo stability test chambers to enable studies at lower room temperatures. We use high end CFC free compressors of Copeland /Kirloskar /Tecumseh / Bitzer/ Danfoss make, conforming to latest international standards and guidelines.

## **DETAILED DESCRIPTION ALONG WITH SALIENT FEATURES ARE AS UNDER FOR REFRIGERATION MACHINE:**

### **CONDENSING UNIT**

#### **AIR-COOLED CONDENSOR**

Air-cooled condenser is internally grooved finned copper tubes used for high heat transfer area, which not only reduce power consumption, but also bring down the condensation faster. This unit is designed. & reduces the resistance, saves energy consumption and ensure good heat exchange.

#### **COMPRESSOR:**

- **HERMETIC COMPRESSOR** :Single stage Reciprocating Compressor. Give the High Efficiency compared to sealed compressors, Less Power Consumption , Accessible for repairing, low noise level, Less Vibrations, Wide Voltage Range, Designed for Extremely High Ambient ,Full warranty etc.
- **COOLING SYSTEM** :The compressor is mounted perfectly to ensure recommended level of sound and vibration.

### **REFRIGERATION CONTROL**

- **Low and High Pressure switch of RANCO/Danfoss** : Which ensures the compressor and refrigeration system when low pressure will occurs it trip off the compressor. This is the only operator friendly switch can easily reset.
- **Hand Shut off Valve** : Is the only Condensing Unit, which is equipped with it. This valve is used for pump down the total gas in to the condenser & receiver in the faulty condition.
- **Liquid Dryer of Danfoss make** : Which is equipped in the liquid line for ministration of moisture in the liquid. It will collect all the moisture in side the refrigeration line as well as gas.

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- **Moisture Indicator of Danfoss make** : The sight glass area in the Moisture Indicator shows at a glance the condition of the refrigerant system. The moisture indicator element changes colour and indicate if the system is safely dry, or dangerously wet.
- **Solenoid Valve of Castle make** : In most refrigeration applications, in order to automatically control the flow of fluids in a system, it is necessary to be able to start or stop the flow in the refrigerant circuit. An electrically operated solenoid valve is usually used for this purpose. Its basic function is the same as a manually operated shutoff valve, but it can be positioned in remote locations, and may be conveniently controlled by simple electrical switches.
- **Oil Separator of Stainless Steel 304**: The oil separator intercepts the oil mixed with compressed gas and returns it into the crankcase of the compressor, thus assuring an efficient lubrication of its moving parts. Also, it improves the overall efficiency in the system.
- **Suction Accumulator** :Maximum Efficiency of the relief device (expansion valve) because it is supplied with sub cooled Liquid.
- **Liquid Receiver** :As per ASME Section VIII Division I for storage of refrigerant.
- **Temperature Control**: The temperature inside our temperature and humidity control test chambers is controlled through Nano technology based HMI & PLC controller.
- **Temperature Range**: Temperature range of our standard Chamber is -75° C to +200° C for air to air chamber and -65° C to +200° C for liquid to liquid chamber. However we have the capacity to modify the same to suit the individual specialized requirements of our customers.
- **Temperature Sensitivity**: Temperature inside our Temperature And Humidity Control test chambers are controlled with a sensitivity of + 0.3 ° C or better.
- **Illumination**: Our Temperature and Humidity Control test chambers are provided with door operated illumination system comprising of fluorescent lights, beside two panels of diffused fluorescent light panel located at the either side of the chamber to enable the user to conduct the photo periodic tests and experiments.
- **Insulation**: The gap of 75 mm between the outer and the inner wall is filled with special grade glass wool to prevent thermal losses.
- **Mineral Glass Wool Insulation**: Glass mineral wool is one of the most environmentally friendly, stable and sustainable insulates available. Glass wool is incombustible by nature. Euro class classification is A. It does not propagate flames and toxic smokes. Thanks to a dense entanglement of materials with a low conduction and trapping

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a great amount of air, glass wool is an excellent thermal insulation. The thickest it is, the best thermal resistance it has, thus reducing heat losses in our equipment's for better sensitivity and economical operations. And its impact on the environment in manufacture, use and disposal is minimal.

- **Air Circulation:** Triple walled back of unit is fitted with two air circulation fans for maintaining temperature uniformly throughout the chamber

#### Features of Coaxial Circulation Fan:

- Vacuum impregnated stator winding with dr. back varnish under red bectol
- Non-hygroscopic.
- Best IR value
- Bright bar (EN - 8 class) shaft.
- Bush bearing of branded companies.
- Surge comparison testing in fans and pumps eliminates into turn short circulating of the stator.
- Pressure die-casted-rotor manufactured with zero error.
- Boats of high accuracy

**Doors:** Triple walled back of unit is fitted with two air circulation fans for maintaining temperature uniformly throughout the chamber

**Voltage:** To work on 220/230V A.C. supply.

**Port hole:** Port holes with silicon enclosure is provided at back side of the chamber. Through the port hole you can input sensors, wires and other test equipment. Silicone foam plugs have excellent temperature and humidity resistance and offer very good thermal insulation. Generally a single port hole is given but more numbers can be increased according to customers request.

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### TECHNICAL SPECIFICATIONS:

MODEL	HB-3ZTSC100
Type	Air to Air
Temperature Range	Hot zone: +60° C to +200° C Cold zone: -75° C to 0° C
Temperature Fluctuation	±1°C
Temperature Controller	HMI+PLC
Display	LCD
External Dimension (WXDXH)	1700mm x 2400mm x 2100mm (customization on request)
Internal Dimension (WXDXH)	508mm x 508mm x 457mm (customization on request)
Max. Load Current	50A
Weight	Approx. 700kg
Power Requirements	220/230V, 50/60Hz

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