Model 6200A Temperature Test Chamber

Chamber designed to utilize the round test wheels that move the DUTs into the test head.

Uses Test Wheels and Test Heads from PRA and S&A Temperature Test Systems

Features:

- CO_2 or LN_2 cooled

- Simple tilt up cover

- Coaxial air flow to improve vertical uniformity

-Enhanced PID Controller

- RS232 COM port interface. Inter chamber daisy chaining of multiple chambers by RS485.

- Front panel status indicators

- Chamber operates in the remote control mode only

- Both hot and cold fail safe temperature settings. Secondary safety coolant valve.

- Long life shielded heater rod.

- Used on PRA temperature test systems

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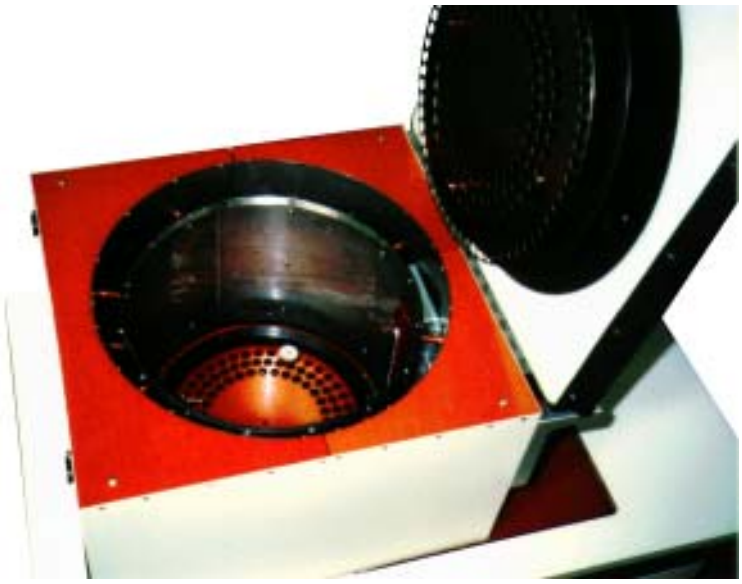
System Features

The PRA Model 6200 is a continuing evolution of the round temperature chamber technology. The round chamber is used to mechanically multiplex the DUTs into the test head. All DUTs have the same short test head lead length through the use of this configuration.

The round chamber continues to provide the most uniform temperature across the DUTs because of the inherent chamber symmetry.



Temperature Sensors The chamber uses platinum resistance sensors which are NIST traceable. The system uses 3 sensors. 1) Primary temperature control sensor, 2) fail safe temperature sensor and 3) the optional sensing of the coolant temperature at the coolant injection control valves. The main temperature sensor and the fail safe temperature sensor have identical accuracies.

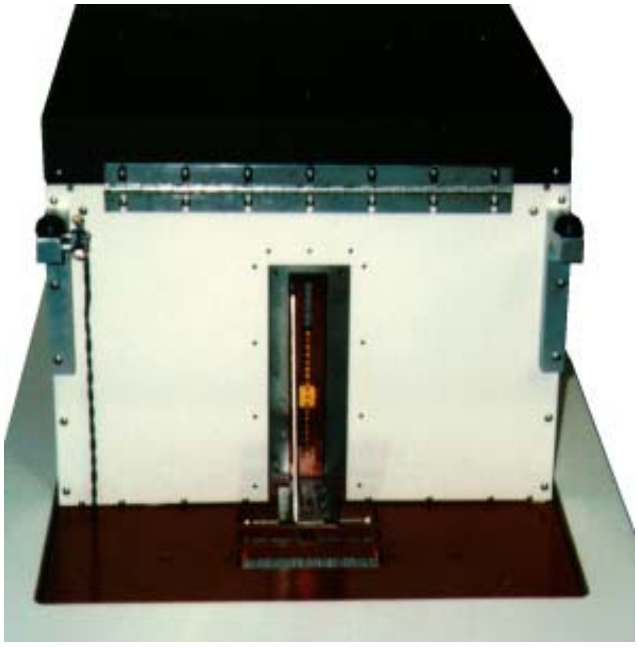
Chamber Cover The chamber cover is a simple tilt cover that swings up on a continuous hinge. The lid tilts back out of the way to permit changing the test wheel. The cover is held closed during chamber operation with a dual latches.

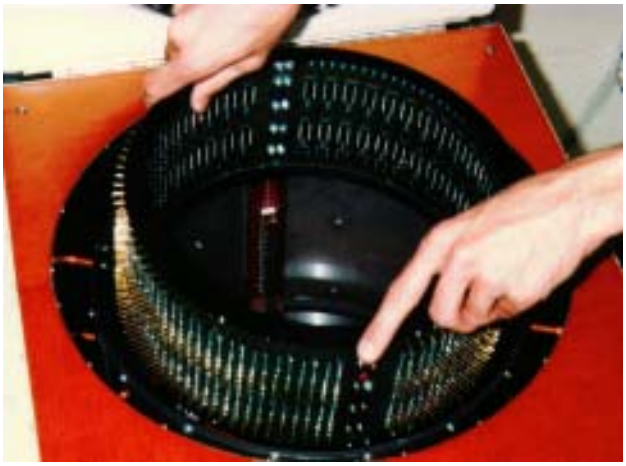
Controller The controller is a real time embedded system processor. The processor performs the needed interface to the remote control, analog to digital converters, front panel display, coolant valves, heater controls and the test wheel movement.

The controller has a small serial eePROM which stores the calibration and operating characteristics.

Test Head Standard PRA Test heads fit the 6200 series test chambers.

The air used to cool the electronics is passed over the back (room temperature side) of the test head. The warm air keeps condensation and frost from forming. This improves measurements at cold temperatures.





Test Wheel and Drive The stepping motor direct gear drive permits dividing the full rotation into 5600 steps. The non accumulative error and the direct drive provide excellent test wheel positioning accuracy.

When the DUTs must be powered during wheel rotation a continuous power cable can be connected through the bottom center of the chamber. This provides simple cable connection to the test wheel. The chamber has simple commands that allow the user to control the test wheel rotational direction to accommodate the continuous power cable without twisting.

Coaxial Air Flow The PRA chamber uses a special air flow pattern and in conjunction with the high rate of air flow, excellent temperature uniformity is achieved.

The processed air first passes upwards around the chamber in a 2.5cm (1") wide plenum. This air isolates the interior sections of the chamber from the outside environment. The air then passes to the center of the cover where further mixing occurs.

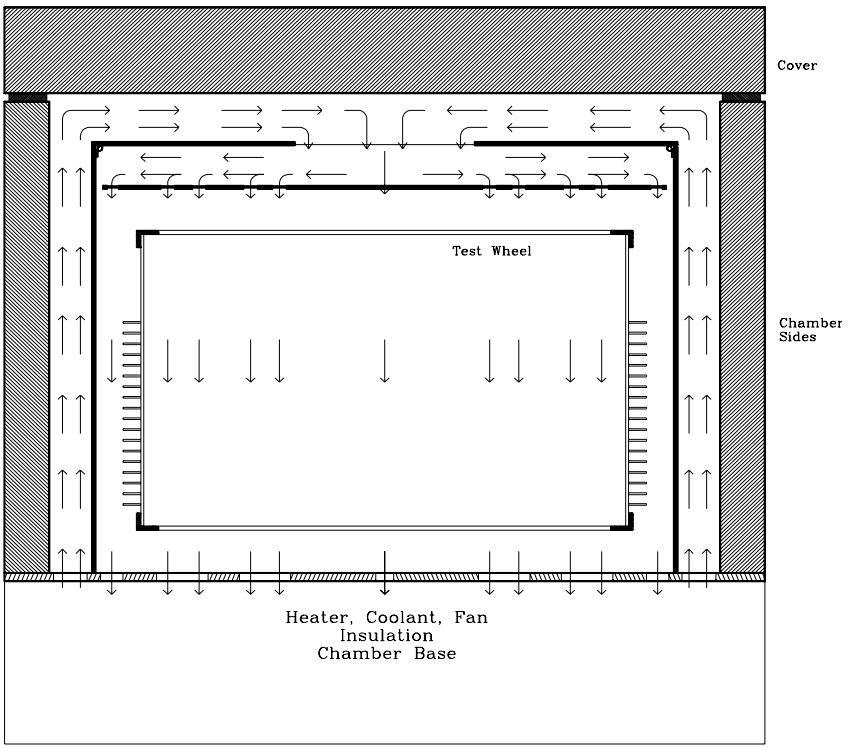
The air then is diffused through a baffle that spreads the air flow over the test wheel and DUTs.

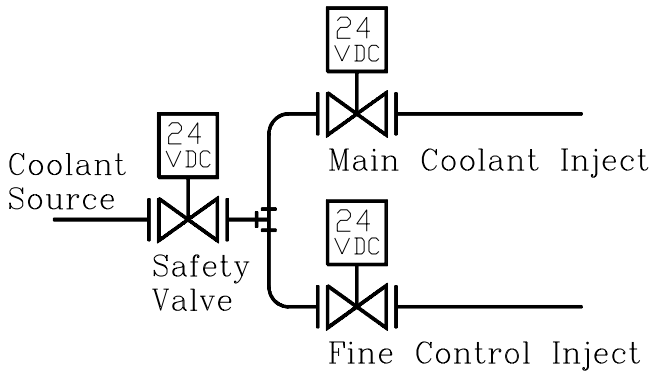
Chamber Heater The heater is controlled by a solid state relay (SSR) which switches the heater across the power mains. The heater is contained in a grounded steel sheath (Calrod™). Accidental DUT ingestion into the heater will not short out or damage the heater.

The heater has a thermal fuse in series. This is set to open the circuit at approximately 175°C. This safety device protects the chamber and heater if the SSR or the circulating fan fails. The thermal fuse is easy to replace. The thermal fuse is removed from the bottom of the chamber.

Coolant Injection and Control The system uses 24V DC operated valves for electrical safety. The chamber has dual injection control valves. The main coolant inject valve is used to speed large temperature excursions, permitting the most coolant injection. The final control valve is used to maintain the temperature control at the set point. The fine control inject permits higher duty cycles, which enhances control and minimizes the temperature transients in the chamber.

The third valve is the Safety Valve or Fail Safe Valve. This valve is in series with the control valves and must be enabled to permit chamber cooling. If the low temperature fail safe limit is broached, all valves are closed. The fail safe valve minimizes any chance of a coolant "run away" condition if a control valve failed close.





Remote Control Interface and Commands The chamber requires an RS232 serial interface. The command language is a simple SCPI command set. Some of the basic commands are:

- Read chamber temperature
- Set chamber temperature and set the slew rate
  - Turn the chamber off
  - Set the upper and lower fail safe limits
  - Set the number of wheel positions.
  - Advance the wheel counter clockwise to a position
  - Advance the wheel clockwise to a position
  - Advance the wheel the shortest distance to a position
  - Perform wheel rotation calibration
  - Perform temperature calibration
  - Do operation diagnostics

The signals that daisy chain the chambers together are dual differential RS485 level signals. Each chamber is assigned an address and the command protocol permits party line operation. The cables and terminations are supplied with the system.

Chamber Maintenance

The Model 6200 was designed to permit easy maintenance and servicing with the minimum of tools.

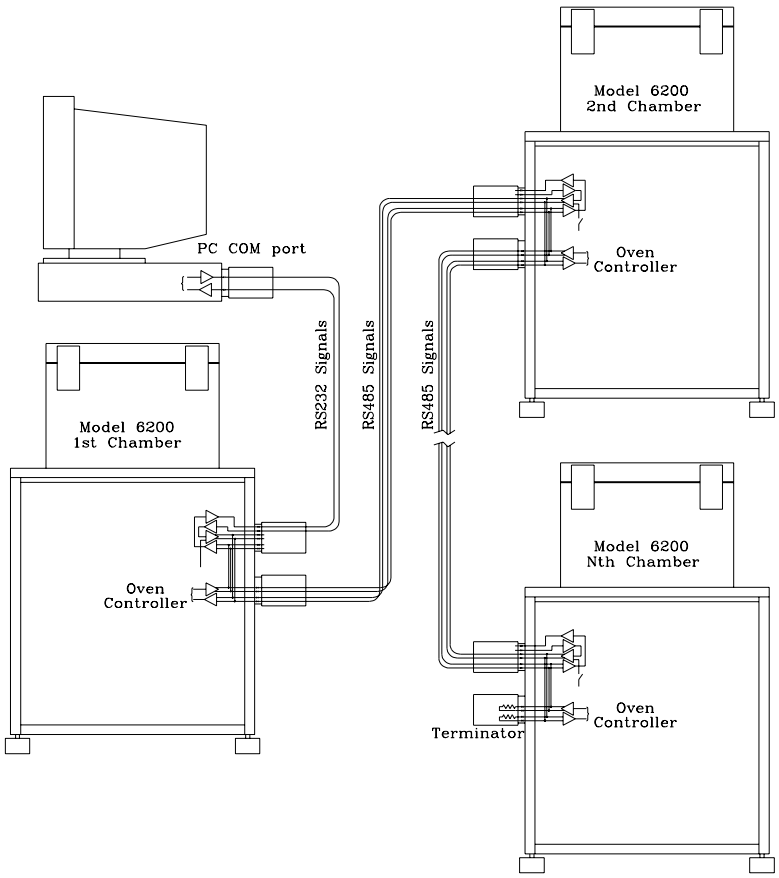
The upper chamber structure (the structure that surrounds the test wheel and the cover) can be removed by loosening four (4) screws.

The test head is held in place with four (4) screws. The test head can be easily moved in and out to properly contact the test wheel.

The chamber control electronics are all mounted on the rear of the chamber. This minimizes any chance of condensate from the chamber dripping onto the electronics. The entire electronics assembly can be removed by removing eight (8) screws and disconnecting the cables.

The lower part of the chamber (access to the fan, coolant inject tubes and heater) can be accessed by removing four (4) more screws after the top is removed.

The test wheel drive mechanism is the same drive that was perfected on the PRA Crystal Plating Ring Tester/Handlers. The metal drive ring has metal drive pins in the ring periphery (no belts or cables).



Specification

Test chamber range:	-65°C to 150°C
Chamber set point:	User setting to 0.01°C resolution User sets the new temperature and the slew rate to follow to the new set temperature.
Accuracy:	Absolute accuracy: ±0.25°C Vertical uniformity: ±0.20°C Radial uniformity: ±0.20°C Stability: ±0.10°C Repeatability: ±0.05°C
Slew rate:	More than 20°C per minute
Test Cavity size:	Up to 7" (18cm) tall test wheel
Coolant:	Specify CO_2 (room temperature or pre-chilled) -or- LN_2

Dual inject valves
1) Fast temperature change inject
2) Fine control inject for precise temperature control

Heater: Long life, grounded sheath heater

Test wheel drive: Rim direct gear drive of the test wheel at the bottom of the chamber
Stepper motor driven 5600 steps/test wheel revolution
Continuous power to the test wheel for the DUTs can be provided via power cable from the center bottom of the chamber.

Controller: Microprocessor controlled chamber.
Calibration and setup parameters are stored in protected serial eePROM.
Temperature control using the enhanced PID algorithm to minimize stabilization time and minimize overshoot.

Fail Safe: The user sets the high and low temperature limits (last settings are permanently stored in the controller).
Exceeding the limits automatically turns the heater, coolant valves (all 3) and circulating air fan OFF.
Safety coolant valve for additional protection from valve failures.
Upper temperature limit also controlled by a Thermal Fuse (user replaceable).

Front panel status indicators: LEDs show chamber operation status.

Coolant:	Indicates if enabled, if the fine control valve is open or if the coarse control valve is open.
Heater:	Indicates if the heater is on
Fan:	If the fan is on
Test wheel:	If the test wheel is enabled (on) and if at reference.
Communication:	If the chamber is receiving control commands

Remote Control: Control is by an RS232 serial interface
9600 baud, 8 bit, no parity
Up to 16 chambers can be daisy chained to one PC COM port.
Can be supplied with USB adapter to provide a COM port

Power: 190 to 260 VAC 50/60 Hz
5 KVA maximum
Operates phase to neutral on the power mains in Europe, PRC, UK and countries with similar power utilities.
Operates phase to phase on the power mains in Canada, Japan, Korea, Taiwan, USA and countries with similar power utilities.