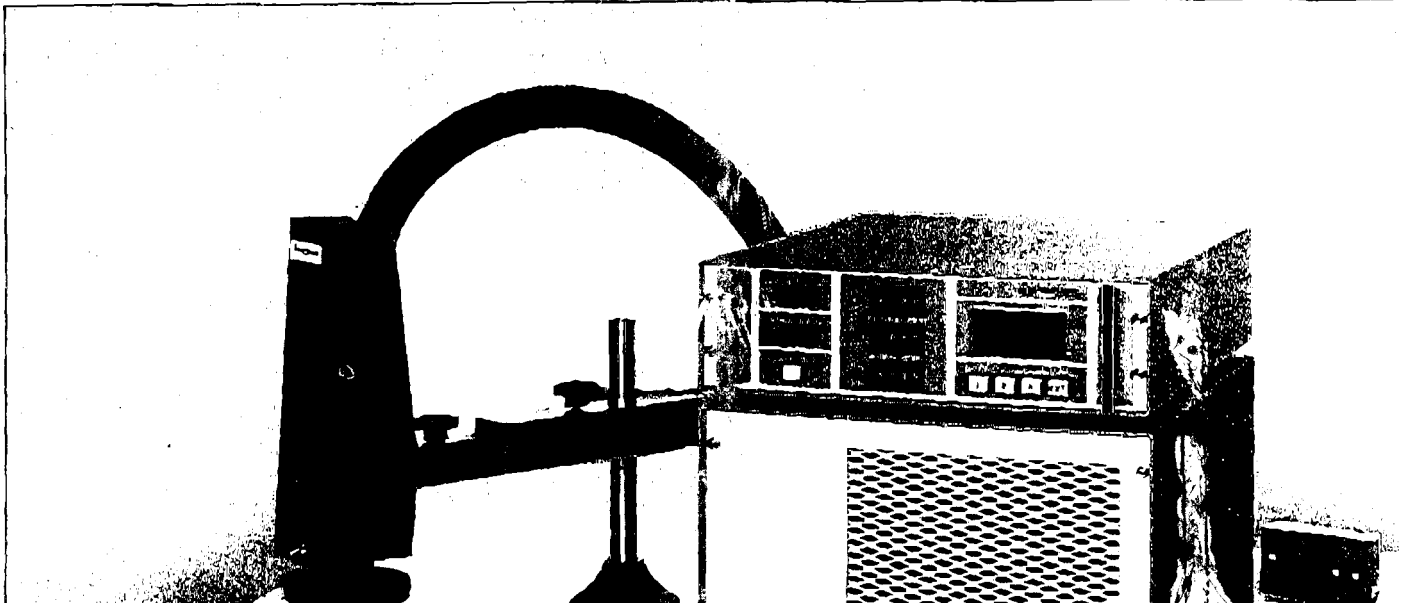




Advanced Test Equipment Rentals
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Model TP0452A ThermoStream® System

digitally controllable for automated testing
 and characterizing of components and
 modules at temperature.



Features

Provides a stream of temperature controlled air/gas from a convenient hand held or fixture mountable wand.
 BCD/TTL controllable.
 IEEE 488 Bus compatibility option.
 Wide temperature range (-60°C to +150°C) with rapid temperature excursions.
 Minimal gradient between component (chip) temperature and temperature readout.
 High accuracy, stability, repeatability.

- Eliminates long wires usually associated with component testing at temperature.
- Inexpensive enclosures available for most package configurations.
- No liquid nitrogen or CO₂ required for the refrigeration system.

- Extremely low cost operation — much less than liquid nitrogen systems.
- Moisture-free operation even at very low temperatures.
- Digital readout.
- Supplies "at temperature" signal. Three temperatures numerically pre-settable on front panel in "local" mode. Overheat indicator, test, and protection circuitry.
- Optional benchtop and floor stands.



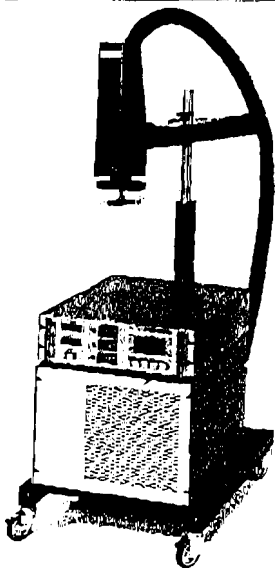
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Optional Accessories

Floor Stand

The floor stand is available when mobility of the entire TP0452A System is desired. Both the controller and refrigeration module may be placed on the floor stand which has casters so that a single ThermoStream System may be made conveniently available to several test stations. The pneumatically operated stand, which applies and retracts the air/gas wand with the flip of a switch, also offers a solution when benchtop space is at a premium. Rotation is possible for horizontal as well as vertical operation.

Total Height: 134.6 cm (53")
Maximum Arm Length: 61 cm (24")
Air Requirements: 3 scfm @ 30 psi
Weight: approx. 45 kg (100 lbs.)

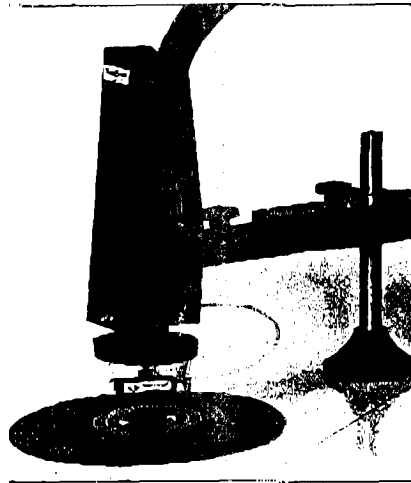


Benchtop Stand

The benchtop stand is available for convenient operation of the air/gas wand on the surface of a tester. The pneumatically operated stand, which applies and retracts the wand with the flip of a switch, is firmly mounted to the

benchtop with four bolts through a 4 inch diameter mounting hub. Rotation is possible for horizontal as well as vertical operation.

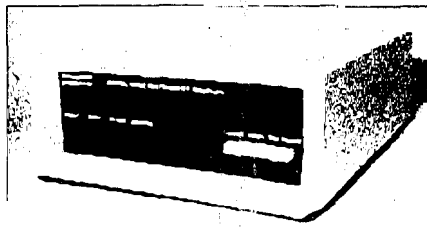
Total Height: 45.7 cm (18")
Maximum Arm Length: 61 cm (24")
Air Requirements: 3 scfm @ 30 psi
Weight: approx. 10 kg (22 lbs.)



IEEE-488 Computer Interface

For those automated instrumentation systems with a standard IEEE 488 Bus, a compatible interface coupler is available. This coupler provides all of the necessary interface functions and cables to connect the system to the bus. It is configured as both a talker and a listener, but may be reduced to a talker only or listener only by setting mode switches on the rear panel. As a talker, the coupler is used to transfer data from the TP0452A to the computer. As a listener, it is used to direct the operation of the TP0452A as controlled by the computer.

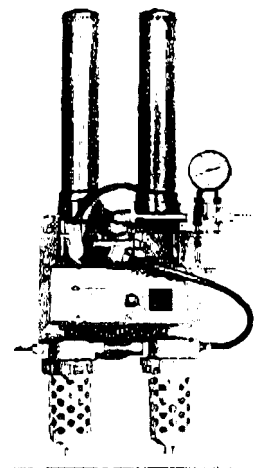
Controls: Power - Energizes unit
 Reset - Clears internal logic
 Rear Panel - includes 5 address switches, 2 mode select switches, and the "ONLY" switch.
Dimensions: 21.59cm (8.5") W x 7.62cm (3.0") H x 25.4cm (10.0") D
Power: 115 or 230 VAC ± 10% 50/60 Hz, 35 watts maximum
Weight: 3.2Kg. (7 lbs.)



Air Dryer

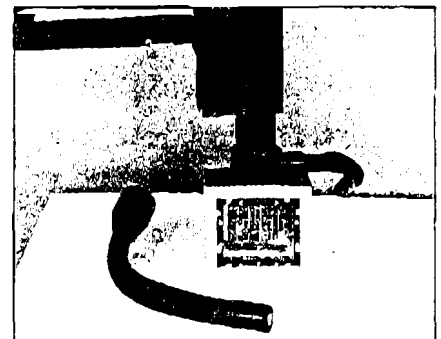
When dry nitrogen is not available, the air dryer allows ordinary shop air to be used for frost free testing at low temperatures. This heatless air dryer provides a continuous supply of dry air by the automatically cycled operation of two desiccant beds; one absorbing moisture from the air while the other is being reactivated.

Input Air Pressure: 100 ± 20 psig
 (.33 ± .07 Kg/cm²).
Dimensions: 61cm x 30.5cm x 30.5cm
 (2 ft x 1 ft x 1 ft)
Weight: 7.6 Kg. (16.8 lbs.)
Piping Connector: NPT 1/4.



Enclosures

For applications involving large modules, printed circuit boards, or complete sub-assemblies, enclosures of various shapes and sizes can be fabricated by the customer. Customers are encouraged to benefit from Temptronic's extensive experience in this area by requesting engineering design assistance.



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System Operation

Manual (Local) Control

Depressing CONTROL SELECT switches 1, 2, or 3 causes the airstream to attain the temperature set on the corresponding TEMPERATURE SET push button selector switch. The appropriate indicator light is illuminated to ensure error free selection. The digital readout displays the actual temperature of the airstream. The AT TEMPERATURE indicator illuminates when the actual temperature is within $\pm 2^\circ\text{C}$ of the set temperature. If the temperature exceeds the operating limit of the system (160°C), power is automatically removed from the heater and the OVERHEAT indicator/switch illuminates. Heater power is restored when this indicator/switch is depressed.

Remote (BCD) Control

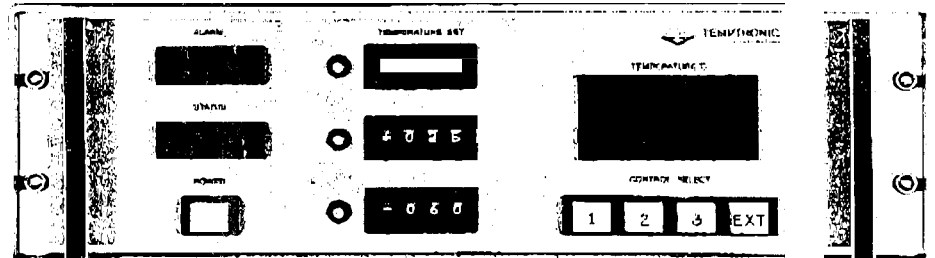
Depressing the EXT switch transfers temperature selection to externally supplied "Data Ready" and BCD

"Temperature Set" control input signals. TTL outputs include Actual temperature (BCD), At Temperature, Overheat, and Out of Range signals.

Thermal Transfer

Thermal contact of the high velocity ThermoStream jet with the object under test is maximized when the layer of air/gas immediately surrounding the object is replaced continuously and rapidly. This is facilitated with an enclosure mounted on the nozzle. The enclosure should be just large enough to

contain the object along with a surrounding layer of circulating air/gas and be equipped with one or two vent holes. For low temperature testing, a second, larger enclosure such as the ThermoCap may be attached to the end of the wand to provide a moisture free environment around the test area.



Specifications

Temperature Range: $-60^\circ\text{C} + 150^\circ\text{C} \pm 5^\circ\text{C}$ at 80°F (27°C) ambient.

Temperature Accuracy: $\pm 1\%$ or $\pm 1^\circ\text{C}$ (whichever is greater).

Temperature Repeatability of Component: $\pm 0.5^\circ\text{C}$.

Temperature Stability of Component: $\pm 0.5^\circ\text{C}$ typ.

Controller Type: Optically coupled zero-cross AC.

Input Signals: All TTL/DTL compatible.

Data Entry (temp. set): 3 decade BCD plus polarity.

Data Ready: Single bit. 10 μsec . minimum pulse width.

Output Signals: All TTL/DTL compatible.

Data Output (Actual Temp.): 3 decade BCD plus polarity, updated at 2PPS rate.

Status (At Temp.): Single bit.

Alarm (Overheat, Out of Range): Single bit.

I/O Connector: 36 pin "Blue Ribbon" (supplied).

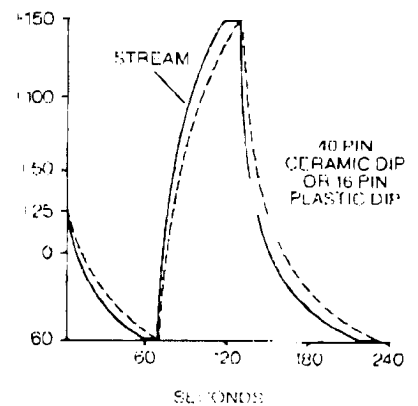
Optional Computer Interface: IEEE-488 Bus coupler.

Input Gas Required: Dry nitrogen at 30 psig (2.1 Kg/cm^2). An optional air dryer is available to allow the use of shop air.

Output Gas Flow: 3CFM ($0.1\text{ m}^3/\text{min}$).

Electrical Power Required: 115 or 230 Volts AC @ 50/60 Hz (as specified), 1250 watts.

Thermal Time Response



Note: Device curves indicate temperature of case bottom with device plugged into a socket.

These specifications are valid for the standard product and are subject to change without notice. Applications requiring modification of electrical, thermal, or mechanical characteristics should be discussed with the factory for possible accommodation at additional cost.

Dimensions:	Width cm (in.)	Height cm (in.)	Depth cm (in.)	Weight Kg (lbs.)
Controller	52.1 (20.5)	19.1 (7.5)	57.2 (22.9)	20 (44)
Cooling/Heating Wand	6.35 (2.5)*	26.7 (10.5)**	---	---
ThermoCap	12.7 (5)*	5.2 (2)	---	---
Refrigeration Module	48.9 (19.25)	38.1 (15)	55.2 (21.75)	50 (110)

*Diameter

**Length

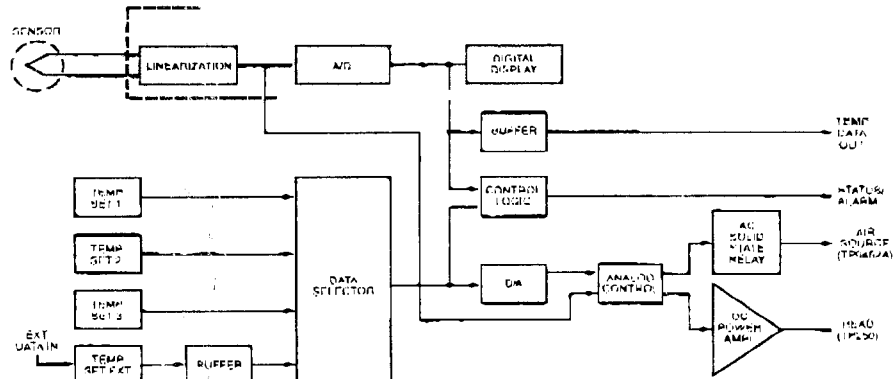
Description

The TP0452A BCD controllable digital ThermoStream System is designed to provide a wide-range programmable thermal environment for the controlled testing of semiconductor devices, modules, and other such components. Two modes of operation allow either pushbutton selection of one of three preselected temperatures or automatic temperature selection by external BCD signals. The external mode allows testing at computer controlled temperatures in production or for extensive characterization in the laboratory.

As with the ThermoSpot and ThermoChuck Systems, the TP0452A ThermoStream System enables the test equipment user to obtain localized temperature control accurately, reliably and conveniently at the test socket. In addition, even large, odd shaped components made of materials of poor thermal conductivity can be brought quickly to low and high temperatures with negligible gradient from component to temperature readout. The accent is on speed, accuracy, and uniformity of temperature. For example, a 16-pin plastic DIP plugged into a socket will reach -55°C in approximately 70-90 seconds with a 2°C gradient at normal load using the TP0452A. Even shorter response times may be achieved by using techniques described in the ThermoStream application notes.

The system consists of a controller, a refrigeration module, and a cooling heating wand. User supplied dry nitrogen (or shop air when using the optional air dryer) enters the controller, passes through the refrigeration module, and exits from the wand at the end of a ten foot long flexible insulated hose. The air/gas stream emitted from the wand is directed at the component under test for precise component temperature control. The controller contains the system electronics and an air/gas flow meter-regulator. Heat exchange occurs in the refrigeration module, throughout the hose, and in the wand for most efficient control.

Block Diagram—Digital Controller

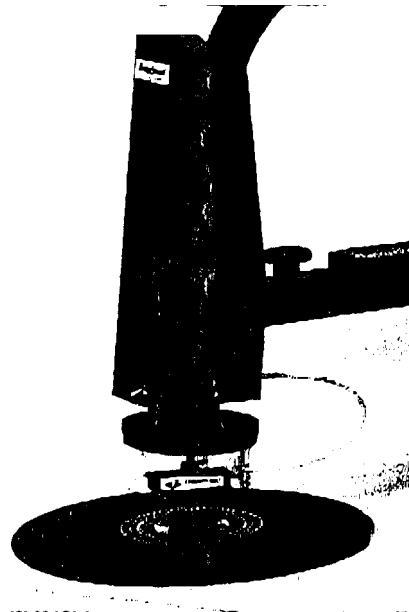


The tapped orifice at the wand outlet provides for a variety of configurations including the double walled plastic ThermoCap, (supplied) which prevents frost from forming at low temperature. At the end of the wand a nozzle and enclosure assembly concentrates the temperature control around the component and automatically adjusts vertically for various component heights. This assembly may be used with or without the ThermoCap and with enclosures of various sizes.

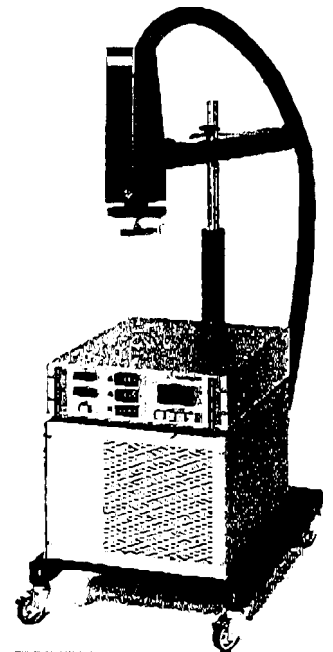
The temperature sensor is located inside the wand near the nozzle outlet for proximity to the object under test. The sensor signal drives the high gain, low

noise, optically coupled, zero-cross, A.C. control system. The result is rapid temperature excursion, high accuracy, and stability.

The system interfaces easily with complex testers and an effective thermal insulation kit is supplied with the system to prevent the outlet air/gas from affecting the temperature of the tester circuitry adjacent to the test socket.



The TP0452A Wand with ThermoCap and enclosure assembly on pneumatically operated stand.



The TP0452A system with mobile pneumatically operated floor stand.