

# PRESSURE & TEMPERATURE

## Quartz Thermometer

### Model 2804A

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HP 2804A

### HP 2804A Quartz Thermometer

The HP 2804A Quartz Thermometer allows you to easily measure temperature with exceptionally high accuracy and resolution. Absolute accuracy is  $\pm 40$  millidegrees Celsius over the range of  $-50^{\circ}\text{C}$  to  $150^{\circ}\text{C}$ , NBS traceable to IPTS-68. The useable resolution of  $0.0001^{\circ}\text{C}$  allows you to measure temperature changes that could not be detected by other digital thermometers.

The HP 2804A can be used with one or two temperature sensing probes. The temperature of either probe, or their difference, can be measured and displayed under pushbutton control. Display resolution is selectable from  $0.01$  to  $0.0001^{\circ}\text{C}$  ( $0.1$  to  $0.001^{\circ}\text{F}$ ) by pushbuttons. An internal switch allows you to easily select measurement in the Celsius or Fahrenheit temperature scale.

Temperature is measured and displayed automatically with the microprocessor and electronics provided in the HP 2804A package. There is no need to balance a bridge, perform calculations using resistance- or voltage-temperature tables or curves, or to use calibration correction tables. The only adjustment necessary to remove effects of thermal history on the sensor is a simple ice point or triple point calibration adjustment using the front panel thumbwheel switches.

#### How It Works

The HP 2804A temperature sensor is a quartz crystal whose precise angle of cut gives a stable and repeatable relationship between resonant frequency and temperature. Each quartz sensor is individually calibrated at the factory over the full temperature range. The calibration data for each sensor is processed and stored in a calibration module which is supplied with the probe.

In operation, a microprocessor in the thermometer performs the complex control and calculation operations to accurately measure temperature from the quartz sensor frequency and probe calibration information in the calibration module. The microprocessor also performs self-checks to detect fault conditions. If a problem occurs that would give an improper measurement, an error message is displayed to indicate the source of the problem.

#### System Oriented Design

The HP-IB (standard) offers you a simple, yet flexible, way to connect the Quartz Thermometer to either an HP computing controller or printer. Temperature data can easily be sent to a computer for processing and recording. All front-panel controls can be operated automatically by commands sent on the bus.

The analog output (standard) converts any three consecutive digits to a voltage between  $0$  and  $+10$  volts to drive a chart recorder. Front-panel controls allow easy adjustment of pen zero and full scale as well as normal or offset (center-zero) operation. Any three digits can be selected for conversion, allowing you to change the full scale value on the recorder.

- $\pm 0.04^{\circ}\text{C}$  absolute accuracy
- $0.0001^{\circ}\text{C}$  or  $0.001^{\circ}\text{F}$  resolution
- $-80^{\circ}$  to  $+250^{\circ}\text{C}$  range
- Display of absolute or differential temperature
- Flexible HP-IB system interface
- Variable resolution analog output
- Easy ice-point or triple-point adjustment



### HP 2804A Specifications

#### Performance

**Range:**  $-80$  to  $250^{\circ}\text{C}$ .

**Absolute accuracy:** HP 2804A with HP 18110A, or HP 18111A Quartz Probe —

$\pm 0.040^{\circ}\text{C}$  from  $-50$  to  $150^{\circ}\text{C}$

$\pm 0.075^{\circ}\text{C}$  from  $-80$  to  $250^{\circ}\text{C}$

NBS traceable to IPTS-68

**Resolution:** three levels can be selected:

Level of selection	Resolution		Nominal time between readings in seconds	
	$^{\circ}\text{C}$	$^{\circ}\text{F}$	T1 or T2	T1 - T2
Low	0.01	0.1	0.1	0.2
Medium	0.001	0.01	1	2
High	0.0001	0.001	10	20

#### General

**Display:** 7-digit LED with polarity, decimal, and degree C or F annunciator.

**Probes:** laboratory probes are available for use with the HP 2804A. Refer to the data sheet for specifications and sheath configurations.

#### Power Required

100, 120, 220, or 240 Vac,  $+5\%$ - $10\%$ , 48 to 66 Hz,  $<30$  VA.

#### Accessories and Probes

	Price
HP 18107A External Oscillator	\$750
HP 18110A Laboratory Probe and cal module, 25 mm (1 in.), Opt 001 Extra Prom	\$2500 \$150
HP 18111A Laboratory Probe and cal module, 230 mm (9.1 in.), Opt 001 Extra Prom	\$2500 \$150
Opt 002 Threaded Probe Connector	\$100

HP 2804A Quartz Thermometer **\$7200**