Tweeners	Models 1502A, 1503, and 1504
Three Tweeners to choose from	
Battery packs available	
Best price/performance package	

One of Hart's best-selling products is the Tweener thermometer, and there's a reason. No other company, not one, has a thermometer that comes close to the performance and features of the Tweener for anywhere near its price.

Model 1502A PRT Readout

The Model 1502A Tweener features accuracy up to ±0.006°C (the Model 1504 is even more accurate, up to ±0.003°C). In addition, it reads both 100-ohm and 25-ohm probes, has a resolution of 0.001°C across its entire range and is the smallest unit in the industry. It also has an optional battery pack for completely portable operation.

Each Tweener is programmable to match any probe's constants for maximum linearity and accuracy. All probe constants and coefficients are programmed through simple, front-panel keystrokes. Temperature is displayed in °C, °F, K, or resistance in ohms.

The 1502A accurately measures the resistance of the probe and then converts the resistance to a temperature value using its built-in algorithms.

For convenience, the 1502A reads the common industrial grade IEC-751 or "385" ALPHA RTD without any programming. Enter the actual R0 and ALPHA of the individual probe for increased accuracy. For maximum accuracy, use the ITS-90 formulas. The Tweener accepts the subranges 4 and 6 through 11.

ITS-90 formulas reside in its firmware. If your probe has been calibrated for any of the subranges of the ITS-90, you simply enter the coefficients directly into the Tweener.

Each thermometer comes complete with an RS-232 interface for automation of temperature data collection, calibrations, or process control functions. An IEEE-488 interface is available as an option.

The 1502A is calibrated digitally using the front-panel buttons. You never have to open the box to calibrate it. This calibration protocol further reduces the cost of the 1502A. It goes where you go and works the way you want it to.

Want more? There are two more Tweeners for specific applications, including the Model 1503 High Temperature PRT Readout and the Model 1504 Thermistor Readout.

Model 1503 High Temperature PRT Readout

The Model 1503 Tweener reads low-resistance, high-temp PRT probes used for temperatures above the aluminum point up to 1200°C. It is absolutely the only readout at this price that reads low-resistance, high-temp probes. It reads 0.25-ohm, 2.5-ohm, 3-ohm, and 5-ohm probes. Its general accuracy is ±0.02°C and typically ±0.15°C at 1200°C. It uses the ITS-90 subranges or a 7th-order polynomial for HTPRTs.

Model 1504 Thermistor Readout

If you need more accuracy in a limited temperature range, the Model 1504 Tweener gives it to you as a thermistor readout. Thermistors are less fragile than PRTs and less likely to be impacted by mechanical shock. Thermistors are more sensitive to temperature, have faster response times, and come in many shapes for different applications.

Typical accuracy of a 1504 is ±0.002°C with a resolution of 0.0001°C.

Software

With our Model 9934 Log*Ware*, all three Tweener models may be used for real-time data acquisition. Collect data and analyze it graphically or statistically. Additionally, Tweeners may be used as reference thermometers with our Calibrate-*it* software. (See our software section starting on page 78.)

Battery Option

If you want freedom from AC power in the field or on the plant floor, order Model 2502 and we'll install a DC power board in your Tweener. Then you can connect your own 12-volt DC power or order Hart's 9313 Battery Pack. Our battery gives you three to eight hours between charges. It includes a charger and a nylon pouch with a belt clip.

Calibration Choices

Each Tweener and its accompanying probe (sold separately) have their own individual calibration reports. Overall system error can be calculated from the individual errors, rendering the added cost of system data unnecessary. However, for those requiring it, system data is available at two or more temperatures of your choice. (See Calibration Model 1929-X on page 158.)

Tweeners are perfect for precision thermometry and as reference thermometers in temperature calibrations (shown here). With Log*Ware software, they can also now be used for real-time data acquisition.*

The thermistor version of the "Tweener" gives you more variety in sensor configurations and even higher accuracy over a limited temperature range.

Specifications	1502A	1503	1504
Temperature Range†	–200°C to 962°C (–328°F to 1764°F)	–200°C to 1200°C (–328°F to 2192°F)	Any thermistor range
Resistance Range	0Ω to 400Ω, auto-ranging	0Ω to 25Ω, auto-ranging	0Ω to 1 MΩ, auto-ranging
Probe	Nominal R_{TPW}: 25Ω to 100Ω RTD, PRT, or SPRT	Nominal R_{TPW}: 0.25Ω, 2.5Ω, 3Ω, and 5Ω PRT	Thermistors
Characterizations	ITS-90 subranges 4, 6, 7, 8, 9, 10, and 11 IPTS-68: R_0, α, δ, a_4, and c_4 Callendar-Van Dusen: R_0, α, δ, and β	ITS-90 subranges 6, 7, and 8 HTPRT 7th-order polynomial reference function with optional 2nd-order deviation function Callendar-Van Dusen: R_0, α, and δ	Steinhart-Hart thermistor polynomial Callendar-Van Dusen: R_0, α, δ, and β
Resistance Accuracy (ppm of reading)	0Ω to 20Ω: 0.0005Ω 20Ω to 400Ω: 25 ppm	0Ω to 2.5Ω: 0.0002Ω 2.5Ω to 25Ω: 80 ppm	0Ω to 5 KΩ: 0.5Ω 5 KΩ to 200 KΩ: 100 ppm 200 KΩ to 1 MΩ: 300 ppm
Temperature Accuracy†**, typical (meter only)**	±0.004°C at –100°C ±0.006°C at 0°C ±0.009°C at 100°C ±0.012°C at 200°C ±0.018°C at 400°C ±0.024°C at 600°C	**2.5Ω–5Ω nominal R_{TPW}** –200°C to 100°C: ±0.02°C 100°C to 400°C: ±0.05°C 400°C to 800°C: ±0.1°C 800°C to 1000°C: ±0.125°C 1000°C to 1200°C: ±0.15°C **0.25Ω nominal R_{TPW}** 0°C to 500°C: ±0.25°C 500°C to 1200°C: ±0.3°C	±0.002°C at 0°C ±0.002°C at 25°C ±0.004°C at 50°C ±0.010°C at 75°C ±0.020°C at 100°C (Using 10 KΩ thermistor sensor, α=0.04. Does not include probe uncertainty or characterization errors.)
Operating Temperature Range	16°C to 30°C	13°C to 33°C	13°C to 33°C
Resistance Resolution	0Ω to 20Ω: 0.0001Ω 20Ω to 400Ω: 0.001Ω	0Ω to 10Ω: 0.00001Ω 10Ω to 25Ω: 0.0001Ω	0Ω to 10 KΩ: 0.01Ω 10 KΩ to 100 KΩ: 0.1Ω 100 KΩ to 1 MΩ: 1Ω
Temperature Resolution	0.001°C	0.01°C	0.0001°C
Excitation Current	0.5 and 1 mA, user selectable, 2 Hz	3 and 5 mA, user selectable	2 and 10 µA, automatically selected
Measurement Period	1 second		
Digital Filter	Exponential, 0 to 60 seconds time constant (user selectable)		
Probe Connection	4-wire with shield, 5-pin DIN connector		
Communications	RS-232 serial standard IEEE-488 (GPIB) optional		
Display	8-digit, 7-segment, yellow-green LED; 0.5-inch-high characters		
Power	115 VAC (±10%), 50/60 Hz, 10 A, nominal 230 VAC (±10%), 50/60 Hz, 10 A, nominal, specify		
Size	5.6" W x 7.1" D x 2.4" H (143 x 181 x 61 mm)		
Weight	2.2 lb. (1.0 kg)		
Probes from Hart	See pages 66–70	See pages 66–70	See pages 72–75

†Temperature ranges and accuracy may be limited by the sensor you use.

Ordering Information

1502A PRT Thermometer
1503 HTPRT Thermometer
1504 Thermistor Thermometer
2502 DC Power Option
2505 Spare Connector
2506 IEEE Option
2507 Mini-Printer
2508 Serial Cable Kit
9934-S Log*Ware,* Single Channel, Single User
9934-M Log*Ware,* Single Channel, Multi User
9313 Battery Pack
9301 Carrying Case, fits Tweener and 12" probe
9308 Carrying Case, fits Tweener and 6" probe
1929-2 System Cal Report, RTDs (See page 158)
Add points, each
1929-5 System Cal Report, Thermistors (see page 158)
Add points, each

See pages 64 to 76 for a selection of probes to use with Tweeners and other Hart readouts.

See our calibration and data acquisition software packages on page 78.