

# GOLD-PLATINUM THERMOCOUPLE

## Model 5629

Primary Standards



Gold-Platinum Thermocouple	Model 5629
Calibration uncertainty of $\pm 0.02^\circ\text{C}$ to $1000^\circ\text{C}$	
Fixed-point calibration included	
Stability better than $\pm 0.02^\circ\text{C}$	

Hart Scientific not only makes the finest SPRTs in the world, we now make the best standards-level thermocouple. Following the designs of NIST and NRC, the Model 5629 Gold-Platinum Thermocouple performs to a level that rivals most high-temperature SPRTs but is easier to use and more affordable.

Until now, type S or type R thermocouples have often been used as high-temperature laboratory standards. Unfortunately, they both use a platinum-rhodium alloy. At temperatures above  $500^\circ\text{C}$ , rhodium oxidizes faster than platinum. This degrades the homogeneity of the thermocouple wire, reducing the accuracy of the standard.

The 5629 Gold-Platinum Thermocouple uses no alloys. Both the gold and platinum wires are 99.999% pure, and because these are the most stable of all metals from  $0^\circ\text{C}$  to  $1000^\circ\text{C}$ , degradation of their accuracy is virtually eliminated.

Because the metals we use are so pure, an uncalibrated 5629 achieves accuracy within  $\pm 0.05^\circ\text{C}$  using the EMF-to-temperature function developed by NIST. Each thermocouple we ship, however, includes a NVLAP-accredited

fixed-point calibration at the freezing points of tin, zinc, aluminum, and silver. From that, we derive two deviation coefficients that, in conjunction with the NIST function, provide maximum accuracy. With an expanded calibration uncertainty of  $\pm 0.02^\circ\text{C}$  ( $k=2$ ), the gold-platinum thermocouple is a true laboratory standard. Under ideal conditions, expanded uncertainties of  $\pm 0.005^\circ\text{C}$  are possible.

Gold-platinum thermocouples are also exceptionally stable. The 5629 repeats within  $\pm 0.02^\circ\text{C}$  after numerous repetitions throughout its range of  $0^\circ\text{C}$  to  $1000^\circ\text{C}$ .

Of course each 5629 includes a reference junction enclosed in stainless steel. We use high-grade copper extension wires meticulously selected for low EMF characteristics. At 9 inches long, our reference junction is longer than average to ensure sufficient immersion with low heat loss in a zero-point temperature source.

High-temperature SPRTs (HTPRTs) define ITS-90 to  $961.78^\circ\text{C}$ . Though not as stable and accurate as a high-quality HTPRT, the 5629 has a number of quali-

ties that make it an effective substitute. Most obvious is price. Not only does an HTPRT cost more than a gold-platinum thermocouple, a fixed-point calibration costs thousands of dollars. With the 5629, a fixed-point calibration is included.

Gold-platinum thermocouples are easier to handle than HTPRTs. They're less susceptible to damage from metal ion contamination and mechanical shock.

The 5629 Gold-Platinum Thermocouple is simply phenomenal, and we don't mind saying so. Try one. If you're not happy, return it in good condition and we'll refund your money.

Specifications	
Temperature Range	$0^\circ\text{C}$ to $1000^\circ\text{C}$
Thermocouple Materials	99.999% pure gold, 99.999% pure platinum
Sheath Materials	Measurement junction of quartz glass, reference junction of stainless steel
Calibration	Freeze points of tin, zinc, aluminum, and silver included
Calibration Uncertainty	$\pm 0.020^\circ\text{C}$ (expanded uncertainty [ $k=2$ ] over entire range)
Stability	$\pm 0.020^\circ\text{C}$ typical
Measurement Junction Sheath Dimensions	7.0 mm diameter x 630 mm length
Reference Junction Sheath Dimensions	4.8 mm diameter x 210 mm length
Minimum Immersion	16" (406 mm)
EMF vs. Temperature Function	NIST equation. Coefficient values included with certificate.
Accuracy	Accuracy will vary according to usage techniques and conditions. Under reasonably good conditions, uncertainties of $\pm 0.02^\circ\text{C}$ can be expected.

### Ordering Information

5629 Gold-Platinum Thermocouple (four-point calibration by fixed point and maple protective case included)