

Ice Point Temperature Reference Equipment

The K170 Ice Point Reference performs ice point referencing for up to 75 thermocouples. The user wires external thermocouples to the unit's input terminals which are in turn connected to matching internal TC's that terminate to copper at the temperature of a thermoelectrically produced ice-water mixture. Thermocouple grade copper wire is taken from ice to MIL style connectors for output. Individual pass thru shield connections can also be provided.

Discussion of Temperature Measurement Errors

The degree of temperature measurement accuracy you can achieve using an ice point reference depends on the grade of T/C wire selected and the level of calibration you use. With each calibration step described below, you can successively improve temperature measurement accuracy.

Use premium-grade thermocouple wire for consistent results.

While the difference in cost between standard and premium-grade wire may be significant, the accuracy you can attain with high quality wire is superior. Standard-grade Type N wire with a 0.75% limit of error, for example, will produce a 3°C error at 400°C. On the other hand, the premium grade contains a 0.4% or 1.6°C error at the same measured temperature. The K170 uses only premium-grade wire.

Even after calibration, the premium grade wire will yield better accuracy due to its more homogeneous composition.

How to Meet Your Accuracy Needs. Assuming the use of premium-grade wire, you can employ the following guidelines to meet your measurement accuracy goals. The example below uses Type N wire.

Method 1: At a gross level using the standard curve fit for a premium Type N T/C—no calibration performed—you can expect about a 1.6°C error at 400°C.

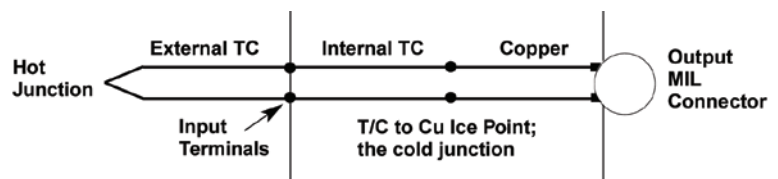
Method 2: You obtain an order of magnitude improvement or about a 0.2°C error with a 3-point calibration of your external T/C's, independent of the K170. The 0.1°C error from the calibration plus the 0.1°C from the K170 equal the total error of 0.2°C. (Assuming the K170 terminals to be at 25°C, the difference from ice point times the 0.4% wire error equals 0.1°C.)

Method 3: Improve measurement error further by calibrating with the external thermocouples wired to the K170. This method reduces the error to about 0.1°C plus 0.4% of difference between the terminal temperature at calibration and at the time of taking actual data.



Method 4: Calibrate the internal and external T/C's separately when you need to reduce temperature errors to the lowest possible value. This method reduces the error inherent in the T/C characteristic differences between the internal and external wire, providing a total measurement error of 0.1°C.

Perform this calibration by monitoring the temperature of a shorted terminal when the K170 has stabilized at each ambient calibration point. Kaye offers this calibration as a service.



Thermocouple circuit of the K170 with external T/C wire connected to input terminals.

Ice Point Reference Specifications

Reference Temperature	0°C
Long Term Drift	None
Stability	±0.02°C typ. ±0.05°C guar.
Total Instrument Error	±0.05°C max.
Number of Channels	Up to 75
Power	115V AC, 60Hz or 230V AC, 50Hz
Dimensions	483mm W x 273mm D (19" W x 10.75" D)

Height

Ch	Non-Shielded	T/C Shielded
6	178mm (7")	NA
12	178mm (7")	NA
24	178mm (7")	178mm (7")
36	178mm (7")	311mm (12.25")
50	311mm (12.25")	311mm (12.25")
75	311mm (12.25")	400mm (15.75")

Ordering Information

Uniform Temperature Reference

Model	Description
UTRs and RTD Reference specified separately.	
X0280	Shielded UTR plate, 32 channels, with enclosure. Specify RTD Reference below.
X0290	Non-shielded UTR plate, 48 channels, with enclosure. Specify RTD Reference below.
X0670	Shielded UTR two plates, 64 channels, with enclosure, 4 output connectors: MS3122E-22-SSP. Specify RTD Reference below.
UTRs included with one RTD Reference per plate.	
X0672	Same as X0670 plus one V0360 full bridge 4-wire RTD per plate.
X0676	Same as X0670 plus one V0370 4-wire RTD per plate.
UTRs included with two RTD References per plate.	
X0674	Same as X0670 plus two V0360 full bridge 4-wire RTD's per plate.
X0678	Same as X0670 plus two V0370 4-wire RTD's per plate.
RTD References	
V0360	Calibrated Resistance Temperature Detector (RTD-20), full bridge circuit
V0370	Calibrated 100Ω 4-wire platinum element (RTD-100) in housing screw terminals.

Ice Point Reference

Model Number	Number of Channels	TC Type (A)	Terminal Location (B)	Shielding (C)	Line Voltage (D)	Calibration (E)
X0260 (K170-6C)	6	X	X	X	X	O
X0261 (K170-12C)	12	X	X	X	X	O
X0262 (K170-24C)	24	X	X	X	X	O
X0263 (K170-36C)	36	X	X	X	X	O
X0264 (K170-50C)	50	X	X	X	X	O
X0265 (K170-75C)	75	X	X	X	X	O

Column A: Specify Thermocouple Type.

of Chs

- _____ Chromel/Constantan (E)
- _____ Iron/Constantan (J)
- _____ Chromel/Alumel (K)
- _____ Plat-13% Rh/Pt (R)
- _____ Plat-10% Rh/Pt (S)
- _____ Copper/Alloy #11 (SX, RX)
- _____ Copper/Constantan (T)

Column B: Specify Terminal Location

Inputs and Outputs to be located on Front Panel or Rear Panel.

Column C: Specify Shielded or Non-shielded

Column D: Specify line Voltage

Column E: Optional Factory Calibration

Warranty and disclaimer:

The information mentioned on documents are based on our current tests, knowledge and experience. Because of the effect of possible influences in an application of the product, they do not exempt the user from their own tests, checks and trials. A guarantee of certain properties or a guarantee for the proper suitability of the product for a specific, especially permanent application cannot be derived from our data. Liability is therefore excluded to that extent permitted by law. Any proprietary rights of third parties as well as existing laws and regulations must be observed by the recipient of the product on his own responsibility.