FLUKE ®

Hart Scientific ®

5649 Type R and 5650 Type S

Thermocouple Standards
User's Guide

Rev. 5B1501

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Rev. 5B1501

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1 Before You Start

1.1 Symbols Used

Table 1 lists the International Electrical Symbols. Some or all of these symbols may be used on the instrument or in this manual.

Table 1 *International Electrical Symbols*

Symbol	Description
	AC (Alternating Current)
	AC-DC
	Battery
	CE Complies with European Union Directives
	DC
	Double Insulated
	Electric Shock
	Fuse
	PE Ground
	Hot Surface (Burn Hazard)
	Read the User's Manual (Important Information)
	Off
	On

Symbol	Description
	Canadian Standards Association
CAT II	OVERVOLTAGE (Installation) CATEGORY II, Pollution Degree 2 per IEC1010-1 refers to the level of Impulse Withstand Voltage protection provided. Equipment of OVERVOLTAGE CATEGORY II is energy-consuming equipment to be supplied from the fixed installation. Examples include household, office, and laboratory appliances.
	C-TIC Australian EMC Mark
	The European Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) mark.

1.2 Safety Information

Use this instrument only as specified in this manual. Otherwise, the protection provided by the instrument may be impaired.

The following definitions apply to the terms "Warning" and "Caution".

- "Warning" identifies conditions and actions that may pose hazards to the user.
- "Caution" identifies conditions and actions that may damage the instrument being used.

1.2.1 ⚠ Warnings

To avoid personal injury, follow these guidelines.

- **DO NOT** use this instrument to measure the temperature of any hazardous live component.
- **DO NOT** use this unit for any application other than calibration work.
- **DO NOT** use this unit in environments other than those listed in the user's manual.
- Use of this instrument at high temperatures for extended periods of time can cause the handle to become hot.
- Follow all safety guidelines listed in the user's manual.
- Calibration Equipment should only be used by Trained Personnel.

1.2.2 ⚠ Cautions

- **DO NOT** drop the thermocouple. This will cause damage to the thermocouple internally and affect its calibration. The thermocouple sheath is brittle and may shatter upon impact. The thermocouple sheath is brittle and may shatter upon impact. The thermocouple sheath is brittle and may shatter upon impact.

- Keep the shipping container in case it is necessary to ship the thermocouple. Incorrect packaging of the thermocouple for shipment can cause irreparable damage.

1.3 Authorized Service Centers

Please contact one of the following authorized Service Centers to coordinate service on your Hart product:

Fluke Corporation, Hart Scientific Division

799 E. Utah Valley Drive
American Fork, UT 84003-9775
USA

Phone: +1.801.763.1600
Telefax: +1.801.763.1010
E-mail: support@hartscientific.com

Fluke Nederland B.V.

Customer Support Services
Science Park Eindhoven 5108
5692 EC Son
NETHERLANDS

Phone: +31-402-675300
Telefax: +31-402-675321
E-mail: ServiceDesk@fluke.nl

Fluke Int'l Corporation

Service Center - Instrimpex
Room 2301 Sciteck Tower
22 Jianguomenwai Dajie
Chao Yang District
Beijing 100004, PRC
CHINA

Phone: +86-10-6-512-3436
Telefax: +86-10-6-512-3437
E-mail: xingye.han@fluke.com.cn

Fluke South East Asia Pte Ltd.

Fluke ASEAN Regional Office
Service Center
60 Alexandra Terrace #03-16
The Comtech (Lobby D)
118502
SINGAPORE

Phone: +65 6799-5588
Telefax: +65 6799-5588
E-mail: antng@singa.fluke.com

When contacting these Service Centers for support, please have the following information available:

- Model Number
- Serial Number
- Voltage
- Complete description of the problem

2 Introduction

2.1 General

The thermocouple is said to be the most widely used temperature sensor (probe) in thermometry and perhaps in all of measurement. A thermocouple appears to be the simplest of all electrical transducers (merely two dissimilar wires coupled at a junction and requiring no electric power supply for measurement). There are numerous advantages of the thermocouple as a temperature sensor. Physically, the thermocouple is inherently simple, being only two wires joined together at the measuring end. A thermocouple normally covers a wide range of temperature, and its output is reasonably linear over portions of range. Unlike many temperature sensors, the thermocouple is not subject to self-heating problems. In practice, thermocouples of the same type are interchangeable within specified limits of error. Also, thermocouple materials are readily available at reasonable cost, the expense in most cases being minimal.

There are various types of thermocouples that are available. Eight types are most commonly used, and are identified by letter designations originally assigned by the Instrument Society of America (ISA) and adopted as an American Standard in ANSI MC 96.1. There are nationally and internationally agreed reference tables for thermal EMF (electromotive force) vs. temperature for these eight types of thermocouples.

TC Type	Composition
Type B	Platinum-30% rhodium (+) versus platinum-6% rhodium (–)
Type E	Nickel-10% chromium (+) versus nickel-45% copper (–)
Type J	Iron (+) versus nickel-45% copper (–)
Type K	Nickel-10% chromium (+) versus nickel-5% aluminum and silicon (–)
Type N	Nickel-14% chromium-1.5% silicon (+) versus nickel-4.5% silicon-0.1 magnesium (–)
Type R	Platinum-13% rhodium (+) versus platinum (–)
Type S	Platinum-10% rhodium (+) versus platinum (–)
Type T	Copper (+) versus nickel-45% copper (–)

Thermocouples employing platinum in combination with platinum-rhodium alloys (or with gold, or palladium) have been found to be the most reproducible of all the various types. They are resistant to oxidation in air and, because of their high melting points, can be used at very high temperatures. The best-known member of this group is the Type S (Pt10Rh/Pt). It was long considered more accurate and has probably been studied more than any other thermocouple; moreover, and presumably for these reasons, it served as the defining instrument in the International Temperature Standards (ITS) for many years (ITS-27, IPTS-48 and IPTS-68). It is not one of the defining instruments of the ITS-90, its role having been taken over by the Standard Platinum Resis-

tance Thermometer (SPRT). The Type S thermocouple is still widely used as a reference standard in many applications.

The Type R thermocouple (Pt13Rh/Pt) is very similar in its properties to the type S; containing 13% Rh by weight, it has a little higher sensitivity. The Type R has remained popular in Britain and certain other parts of the world in preference to the Type S.

This has been not without good reason, because the Type R thermocouple appears to be significantly more stable than the Type S. During an extensive series of measurements made at the National Physics Laboratory (NPL), the National Bureau of Standards (NBS) and the National Research Council of Canada between 1969 and 1971, it became clear that not only was the Type R more stable than the Type S, but the variations between thermocouples made to the same nominal composition by six manufactures were much less. The reason for this is evident from Fig 1, which shows the EMF for a series of temperatures up to 1200°C for a range of alloys of platinum with rhodium vs. platinum. The rate of change of EMF with rhodium content at a composition of 13% rhodium is rather less than 10% rhodium. Since most changes in EMF of platinum/rhodium thermocouples stem from changes in rhodium content of the alloy arm, it is clear why the Type R thermocouple is better than the type S.

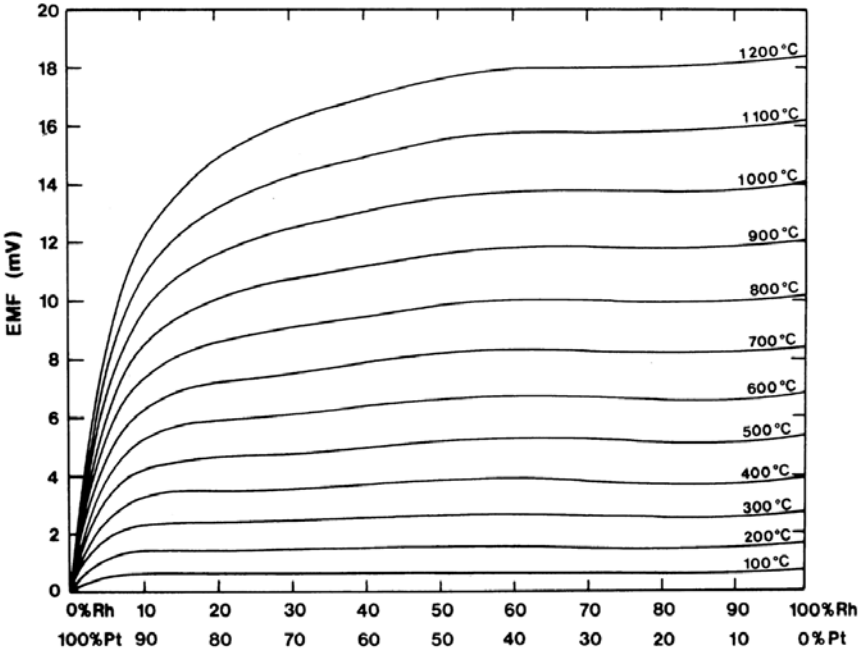

Figure 1 *The EMF of rhodium-platinum alloys against platinum*

2.2 Distinguishing Features of Hart 5649/5650 Type R/Type S Thermocouple Standards

The performance of a Type R or a Type S thermocouple depends strongly on the annealing process, materials used, and other construction techniques. The uncertainty of a Type R (or Type S) thermocouple can vary from 0.2°C to 2°C or higher. The Type S thermocouple was a defining instrument in the ITS-27, the ITPS-48 and IPTS-68 as we mentioned previously. The Type S thermocouple standard, in order to qualify as a defining instrument of the ITS, had to meet strict requirements for purity and thermocouple EMF. Many national laboratories have accumulated significant experience concerning how to manufacture a Type S thermocouple as a qualified defining instrument of ITS. Hart 5649/5650 thermocouple standards are manufactured according to the traditional manner used in many national laboratories for the construction of Type S thermocouple as a defining instrument in the IPTS-48 and IPTS-68. Consequently Hart 5649/5650 thermocouple standards can meet the strict requirements set by the IPTS-48 and IPTS-68.

Some (not all) important points when designing and constructing thermocouple standards are listed below:

1. The best materials are used, including high purity platinum wire ($\alpha > 0.003925$) and high quality platinum/rhodium wire of optimum size (diameter: 0.5 mm); gas-tight high-purity alumina (99.8%) insulator and sheath.
2. Special cleaning treatments of all materials used to avoid contamination, including firing alumina insulators and sheaths for an hour at 1100°C and other treatments.
3. Anneal thermocouple wires along their entire length by passing an electric current through each wire as it hangs between two electrodes in clean air. The platinum wire is annealed at 1100°C and the platinum-rhodium wire at 1450°C for a specific period of time, followed by an annealing at a lower temperature.
4. After assembly into an insulator and a thermocouple sheath, the sheathed portion of the thermocouple receives further annealing in a special annealing furnace at 1100°C, and then at a lower temperature. The length of the annealing furnace should be longer than 1 m with a uniform temperature zone of 800 mm within ±3°C in the center of the furnace.

All of the sophisticated procedures (whether mentioned here, or not) render the thermocouple in a condition which is homogeneous and metallurgically stable over the entire temperature range.

2.3 Application

5949/5950 thermocouple standards are mainly used in the following applications:

1. As reference standards in the calibration of other temperature probes, such as various working thermocouples, industrial PRTs and other probes.
2. In making direct temperature measurements where the lowest uncertainty is required.
3. As control sensors for special applications requiring high precision.

2.4 Calibration

In order for any instrument to be used as a standard it must be calibrated. We calibrate each thermocouple wire spool used to construct 5649/5650 thermocouple standards and check its homogeneity. We refer to it as wire calibration with an expanded uncertainty (k=2) of 0.5°C up to 1100°C. Wire calibration is provided with each 5949/5950 thermocouple standard purchase free of charge. If you want lower uncertainty, you can purchase a fixed-point calibration with your thermocouple standard. The expanded uncertainty is 0.15°C up to 1000°C for fixed-point calibration, and 2.5°C from 1000°C to 1450°C.

2.5 Recalibration

The recalibration of the 5949/5950 thermocouple standards should be scheduled according to the user's company Quality Assurance requirements. Normally, a thermocouple standard is recalibrated annually, or biannually.

3 Specifications

3.1 Specifications

Model		5649	5650
Type		R (Pt13%Rh/Pt)	S (Pt10%Rh/Pt)
Range		0°C to 1450°C	
	For high accuracy	0°C to 1100°C	
Long term stability (depending on usage)	Up to 1100°C	± 0.5°C	
	Up to 1450°C	± 2°C	
Short term stability	Up to 1100°C	± 0.2°C	
	Up to 1450°C	± 0.6°C	
Calibration (wire spool, standard)	Up to 1100°C	± 0.5°C	
	Up to 1450°C	± 3.5°C	
Calibration (fixed point, optional)	Up to 1000°C	± 0.15°C	
	Up to 1450°C	± 2.5°C	
Protection sheath	Material	Alumina (99.8% pure Al2O3)	
	Diameter	0.25 inch (6.35 mm)	
	Length	20 inch (508 mm) or 25 inch (635 mm)	
Cold junction sheath	Material	Stainless steel	
	Diameter	0.188 inch (4.8 mm)	
	Length	8.25 inch (210 mm)	
Copper leads to readout	Material	Teflon-insulated, low EMF solid copper	
	Length	70.4 inch (1788 mm)	
Immersion		At least 6 inchs recommend	
Weight		2 lb. (1 kg)	

3.2 Construction

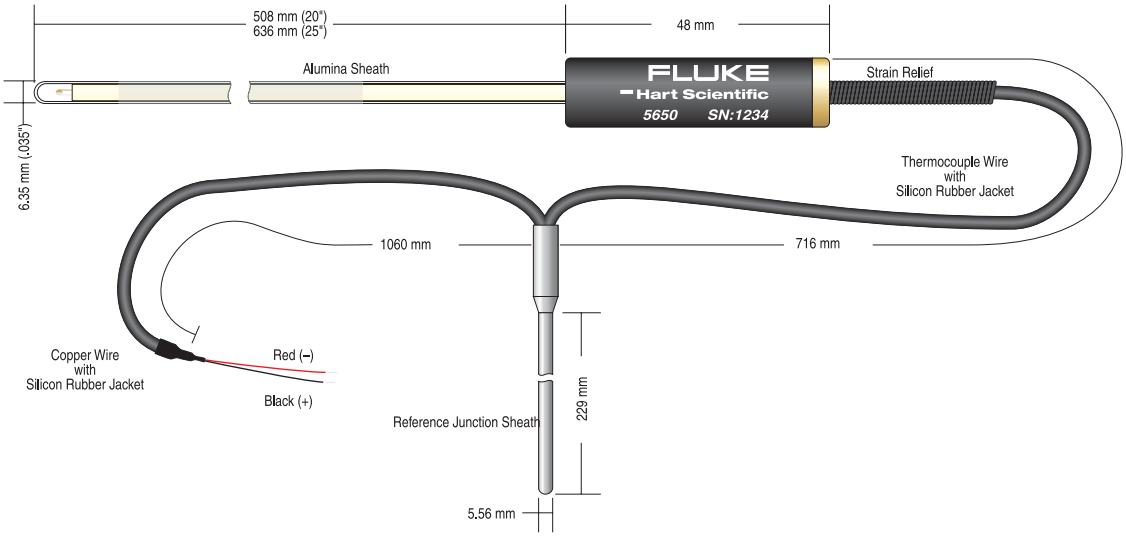

Figure 2 *Construction and Standard Dimensions*

3.3 Lead Wire Identification

The 5949/5950 thermocouple standards are equipped with two Teflon-insulated, tin-plated low EMF solid copper wires. The positive thermoelement is sheathed in black and the negative thermoelement is sheathed in red.

3.4 Warranty

Fluke Corporation, Hart Scientific Division (Hart) warrants this product to be free from defects in material and workmanship under normal use and service for a period as stated in our current product catalog from the date of shipment. This warranty extends only to the original purchaser and shall not apply to any product which, in Hart's sole opinion, has been subject to misuse, alteration, abuse or abnormal conditions of operation or handling.

Software is warranted to operate in accordance with its programmed instructions on appropriate Hart products. It is not warranted to be error free.

Hart's obligation under this warranty is limited to repair or replacement of a product which is returned to Hart within the warranty period and is determined, upon examination by Hart, to be defective. If Hart determines that the defect or malfunction has been caused by misuse, alteration, abuse or abnormal condi-

tions or operation or handling, Hart will repair the product and bill the purchaser for the reasonable cost of repair.

To exercise this warranty, the purchaser must forward the product after calling or writing Hart for authorization. Hart assumes NO risk for in-transit damage.

For service or assistance, please contact an Authorized Service Center (see Section 1.3).

THE FOREGOING WARRANTY IS PURCHASER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OR MECHANTABILITY, OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE. HART SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR LOSS WHETHER IN CONTRACT, TORT, OR OTHERWISE.

4 Operation

4.1 General

For best results, be familiar with the operation of all heat sources and the EMF-measuring instrument. Be sure to follow the manufacturer's instructions for the EMF-measuring instrument and the heat sources.

4.2 Measurement Uncertainty Components

The total uncertainty of temperature measurement using type a 5649/5950 thermocouple mainly includes the following components:

- Uncertainty of the thermocouple itself (0.5°C by wire spool calibration)
- Uncertainty of EMF measurement
- Uncertainty from measurement process and thermal source (furnace, drywell or bath), such as conductivity along the stem caused by short immersion depth, temperature gradient and others.

There are a few other factors which might contribute an amount to the total uncertainty, such as cold junction uncertainty. As we will mention later, this kind of uncertainty component can be decreased so as to be negligible (< 0.01°C) by a cold junction carefully prepared. We will discuss these uncertainty components in detail later.

4.3 EMF Measurements

There are various DC voltage measuring instruments from which the user can choose, such as digital voltmeters, potentiometers, specially designed readouts for thermocouples, data loggers, and computer based data acquisition systems. The choice of a specific instrument will depend on the accuracy required for the measurements. The uncertainty caused from an EMF measurement might be the main component of the total expanded uncertainty. Here we give a few examples for your reference. A Model 2182 Nanovoltmeter is often used for thermocouple measurements requiring the highest accuracy. The 90-day accuracy for the range of 100 mV is 25 ppm of the reading plus 3 ppm of the full range. Hart provides two models of readouts specially designed for high-accuracy thermocouple measurements: Model 1560 with Module 2565 (accuracy: 2μV) and Model 1529 (accuracy: 5μV). The uncertainties of these instruments

for Type R and Type S thermocouples are calculated at 200°C, 400°C, 600°C, 800°C and 1000°C (Table 2).

Table 2 *Readout uncertainty examples*

	Uncertainty								
	Model 2182			Model 1560 & 2565			Model 1529		
t (°C)	(µV)	Type R (°C)	Type S (°C)	(µV)	Type R (°C)	Type S (°C)	(µV)	Type R (°C)	Type S (°C)
200	0.34	0.038	0.040	2.00	0.23	0.24	5.0	0.56	0.59
400	0.38	0.037	0.040	2.00	0.19	0.21	5.0	0.48	0.52
600	0.44	0.038	0.043	2.00	0.18	0.20	5.0	0.44	0.49
800	0.49	0.040	0.045	2.00	0.16	0.18	5.0	0.41	0.46
1000	0.55	0.042	0.048	2.00	0.15	0.17	5.0	0.38	0.43

If an uncertainty of 0.5 °C in the range from 0°C to 1100°C is required, you can choose Model 2182 Nanovoltmeter with Model 5649 Type R thermocouple standard. Other possible choices are listed in Table 3. Here we assume that the uncertainty from the measurement process and thermal source is very low. If this is not the case, you should add the uncertainty components of this kind to the total uncertainty.

Table 3 *Some examples of total expanded uncertainties (k=2) with different readouts*

Total uncertainty (°C)	Temperature range (°C)	Readout	Thermocouple
0.2	0°C to 1000°C	Model 2182	Model 5649 with fixed point calibration
0.5	0°C to 1100°C	Model 2182	Model 5649
0.6	0°C to 1100°C	Model 1560 & 2565	Model 5649/5650
0.8	0°C to 1100°C	Model 1529	Model 5649/5650

4.4 Operation Temperature range and Preventing Thermocouple Contamination

Type R and Type S thermocouples are recommended for continuous use in oxidizing or inert atmospheres over the temperature range of 0°C to 1450°C. They can be used up to 1600°C for a short time period. As thermocouple standards the maximum temperature limit of Model 5649/5650 is 1450°C. Overheating (above 1450°C) will deteriorate the thermocouples. They should not be used in reducing atmospheres, nor those containing metallic or nonmetallic vapors. For high accuracy application, we suggest that Model 5949/5950 should only be used in the temperature range up to 1100°C.

At high temperatures, metal ions can readily diffuse through quartz glass. Metals or metal oxides can also be volatile. If the platinum or platinum/rhodium thermoelements are contaminated by other metals, significant degradation of thermocouple properties will occur.

Unlike platinum resistance thermometers, a thermocouple generates EMF only in the regions where the thermoelements pass through a thermal gradient. In proper usage, the measuring junction of a thermocouple is placed in a relatively isothermal environment, deep inside a uniform zone of a furnace or isothermal block, for example. As a consequence of the small thermal gradients, the portion of thermocouple near the measuring junction contributes only a small portion of the total EMF generated by the thermocouple, and contamination of measuring junction region of the thermocouple will have negligible effect. In contrast, it is very important to protect from chemical contamination the portion of the thermocouple that passes from room temperature to a temperature close to that of the measuring junction. Experience with type S thermocouples over many years has shown that high-quality sintered alumina provides an effective barrier to thermocouple contamination, provided that the alumina is not

cracked. When we designed the Model 5649/5650, we pay special attention to preventing thermocouple contamination. A length of high quality alumina tube with double bores is used as an insulator, and another piece of high quality alumina tube with one end closed is used as a sheath to protect the entire thermocouple. We have seen no evidence of drift after more than two hundred of hours of heating at 1000°C when the thermocouple sheath was surrounded by an Inconel block. Though, our designs of Model 5649/5650 have solved the contamination problem in the temperature range up to 1100°C, more preventive cautions are always helpful:

- For high-accuracy application (expanded uncertainty = 0.5 °C) limit the maximum temperature up to 1100°C.
- Keep the outer surface of the alumina sheath clean. Always clean the sheath with tissue wetted with alcohol before any high temperature application.
- When using the Model 5949/5950 above 1100°C, there should be no base metals in the high temperature environment.
- Minimize the time period of usage at high temperatures when possible.

4.5 Reference Junction (Cold Junction)

The low uncertainty of Model 5949/5950 requires a carefully prepared a mixture of ice and distilled water in a dewar to maintain the temperature of the reference junction probe at 0°C. The ice should be finely-crushed or shaved ice that has been prepared from distilled water (or DI water). The ice should be saturated with distilled water, and then packed gently into an insulating dewar flask, such that ice fully fills the volume of the flask with no large voids. The cold junction sheath should be nearly immersed into the ice mixture, and the total immersion depth into the ice mixture should be at least 8 inch (200 mm). Do not immerse the hub of the cold junction sheath. In this way the reference junction uncertainty component will be much less than 0.01°C, which is negligible, compared to other uncertainty components. Other methods to maintain the reference junction at a stable temperature might be used, and the uncertainty component from the reference junction temperature should be estimated by the user.

4.6 Immersion Requirements

Stem effect can cause measurement errors for any thermometer not immersed deep enough into the medium. This error is due to heat lost by the measuring junction through the thermocouple stem.

The immersion depth required is dependent on several factors including accuracy requirements, temperature measured, and assembly conditions. Therefore the 6 inch minimum immersion depth we suggested is only for your reference. The exact immersion depth required can be determined by performing a gradient test taking measurements approximately every ½ inch (1.27 cm) until there

is a significant difference in reading. Allow the thermocouple to stabilize at each new depth. Plot the results to see the stem effect.

5 Care

The 5649/5650 thermocouple standards are delicate instruments. Great care must be taken in handling the thermocouples to maintain their performance. The alumina sheath and alumina insulator protect the thermocouple wires from contamination. If the sheath or the insulator is broken, the thermocouple wires will be contaminated. The alumina tubes (sheath and insulator) are very fragile and easily broken; handle the thermocouple sheath with great care.

The platinum wire and platinum/rhodium wire will easily be contaminated by other metals at high temperatures (see Section 4.4 for more information). Keep the thermocouple sheath as clean as possible. The 5649/5650 thermocouple standards should be used only in a clean, dirt-free area. Follow the other instructions in Section 4.4 to prevent contamination. Clean the sheath before each use with reagent grade alcohol.

6 Appendix A

6.1 Polynomial Coefficients for Generating Thermocouple EMF as a Function of Temperature

The following tables contains sets of polynomial coefficients used to compute EMF for Type R and Type S thermocouples, when reference junctions are at 0°C. The coefficients given are for an expression of the following form:

$$E = C_0 + C_1 t + C_2 t^2 + C_3 t^3 + \ldots\ldots + C_n t^n \quad (1)$$

Table 4 *Polynomial Coefficients for Type R thermocouple*

Temperature Range	–50°C to 1064.18°C	1064.18°C to 1664.5°C	1664.5°C to 1768.1°C
C0 =	0.0	2.951 579 253 16	$1.522\,321\,182\,09 \times 10^{2}$
C1 =	$5.289\,617\,297\,65 \times 10^{-3}$	$-2.520\,612\,513\,32 \times 10^{-3}$	$-2.688\,198\,885\,45 \times 10^{-1}$
C2 =	$1.391\,665\,897\,82 \times 10^{-5}$	$1.595\,645\,018\,65 \times 10^{-5}$	$1.712\,802\,804\,71 \times 10^{-4}$
C3 =	$-2.388\,556\,930\,17 \times 10^{-8}$	$-7.640\,859\,475\,76 \times 10^{-9}$	$-3.458\,957\,064\,53 \times 10^{-8}$
C4 =	$3.569\,160\,010\,63 \times 10^{-11}$	$2.053\,052\,910\,24 \times 10^{-12}$	$-9.346\,339\,710\,46 \times 10^{-15}$
C5 =	$-4.623\,476\,662\,98 \times 10^{-14}$	$-2.933\,596\,681\,73 \times 10^{-16}$	
C6 =	$5.007\,774\,410\,34 \times 10^{-17}$		
C7 =	$-3.731\,058\,861\,91 \times 10^{-20}$		
C8 =	$1.577\,164\,823\,67 \times 10^{-23}$		
C9 =	$-2.810\,386\,252\,51 \times 10^{-27}$		

Table 5 *Polynomial Coefficients for Type S thermcopuble*

Temperature Range	–50°C to 1064.18°C	1064.18°C to 1664.5°C	1664.5°C to 1768.1°C
C0 =	0.0	1.329 004 440 85	$1.466\ 282\ 326\ 36 \times 10^{2}$
C1 =	$5.403\ 133\ 086\ 31 \times 10^{-3}$	$3.345\ 093\ 113\ 44 \times 10^{-3}$	$-2.584\ 305\ 167\ 52 \times 10^{-1}$
C2 =	$1.259\ 342\ 897\ 40 \times 10^{-5}$	$6.548\ 051\ 928\ 18 \times 10^{-5}$	$1.636\ 935\ 746\ 41 \times 10^{-4}$
C3 =	$-2.324\ 779\ 686\ 89 \times 10^{-8}$	$-1.648\ 562\ 592\ 09 \times 10^{-9}$	$-3.304\ 390\ 469\ 87 \times 10^{-8}$
C4 =	$3.220\ 288\ 230\ 36 \times 10^{-11}$	$1.299\ 896\ 051\ 74 \times 10^{-14}$	$-9.432\ 236\ 906\ 12 \times 10^{-15}$
C5 =	$-3.341\ 651\ 963\ 89 \times 10^{-14}$		
C6 =	$2.557\ 442\ 517\ 86 \times 10^{-17}$		
C7 =	$-1.250\ 688\ 713\ 93 \times 10^{-20}$		
C8 =	$2.714\ 431\ 761\ 45 \times 10^{-24}$		

6.2 Tables for Type R Thermocouple

Table 6 *Type R Thermocouple –50°C to 1760°C vs milliVolts*

Type R Thermocouple

°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV
–50	–0.226	–49	–0.223	–48	–0.219	–47	–0.215	–46	–0.211	–45	–0.208	–44	–0.204	–43	–0.200	–42	–0.196	–41	–0.192
–40	–0.188	–39	–0.184	–38	–0.180	–37	–0.175	–36	–0.171	–35	–0.167	–34	–0.163	–33	–0.158	–32	–0.154	–31	–0.150
–30	–0.145	–29	–0.141	–28	–0.137	–27	–0.132	–26	–0.128	–25	–0.123	–24	–0.119	–23	–0.114	–22	–0.109	–21	–0.105
–20	–0.100	–19	–0.095	–18	–0.091	–17	–0.086	–16	–0.081	–15	–0.076	–14	–0.071	–13	–0.066	–12	–0.061	–11	–0.056
–10	–0.051	–9	–0.046	–8	–0.041	–7	–0.036	–6	–0.031	–5	–0.026	–4	–0.021	–3	–0.016	–2	–0.011	–1	–0.005
0	0.000	1	0.005	2	0.011	3	0.016	4	0.021	5	0.027	6	0.032	7	0.038	8	0.043	9	0.049
10	0.054	11	0.060	12	0.065	13	0.071	14	0.077	15	0.082	16	0.088	17	0.094	18	0.100	19	0.105
20	0.111	21	0.117	22	0.123	23	0.129	24	0.135	25	0.141	26	0.147	27	0.153	28	0.159	29	0.165
30	0.171	31	0.177	32	0.183	33	0.189	34	0.195	35	0.201	36	0.207	37	0.214	38	0.220	39	0.226
40	0.232	41	0.239	42	0.245	43	0.251	44	0.258	45	0.264	46	0.271	47	0.277	48	0.284	49	0.290
50	0.296	51	0.303	52	0.310	53	0.316	54	0.323	55	0.329	56	0.336	57	0.343	58	0.349	59	0.356
60	0.363	61	0.369	62	0.376	63	0.383	64	0.390	65	0.397	66	0.403	67	0.410	68	0.417	69	0.424
70	0.431	71	0.438	72	0.445	73	0.452	74	0.459	75	0.466	76	0.473	77	0.480	78	0.487	79	0.494
80	0.501	81	0.508	82	0.516	83	0.523	84	0.530	85	0.537	86	0.544	87	0.552	88	0.559	89	0.566
90	0.573	91	0.581	92	0.588	93	0.595	94	0.603	95	0.610	96	0.618	97	0.625	98	0.632	99	0.640
100	0.647	101	0.655	102	0.662	103	0.670	104	0.677	105	0.685	106	0.693	107	0.700	108	0.708	109	0.715
110	0.723	111	0.731	112	0.738	113	0.746	114	0.754	115	0.761	116	0.769	117	0.777	118	0.785	119	0.792
120	0.800	121	0.808	122	0.816	123	0.824	124	0.832	125	0.839	126	0.847	127	0.855	128	0.863	129	0.871
130	0.879	131	0.887	132	0.895	133	0.903	134	0.911	135	0.919	136	0.927	137	0.935	138	0.943	139	0.951
140	0.959	141	0.967	142	0.976	143	0.984	144	0.992	145	1.000	146	1.008	147	1.016	148	1.025	149	1.033
150	1.041	151	1.049	152	1.058	153	1.066	154	1.074	155	1.082	156	1.091	157	1.099	158	1.107	159	1.116
160	1.124	161	1.132	162	1.141	163	1.149	164	1.158	165	1.166	166	1.175	167	1.183	168	1.191	169	1.200
170	1.208	171	1.217	172	1.225	173	1.234	174	1.242	175	1.251	176	1.260	177	1.268	178	1.277	179	1.285
180	1.294	181	1.303	182	1.311	183	1.320	184	1.329	185	1.337	186	1.346	187	1.355	188	1.363	189	1.372
190	1.381	191	1.389	192	1.398	193	1.407	194	1.416	195	1.425	196	1.433	197	1.442	198	1.451	199	1.460
200	1.469	201	1.477	202	1.486	203	1.495	204	1.504	205	1.513	206	1.522	207	1.531	208	1.540	209	1.549
210	1.558	211	1.567	212	1.575	213	1.584	214	1.593	215	1.602	216	1.611	217	1.620	218	1.629	219	1.639
220	1.648	221	1.657	222	1.666	223	1.675	224	1.684	225	1.693	226	1.702	227	1.711	228	1.720	229	1.729
230	1.739	231	1.748	232	1.757	233	1.766	234	1.775	235	1.784	236	1.794	237	1.803	238	1.812	239	1.821
240	1.831	241	1.840	242	1.849	243	1.858	244	1.868	245	1.877	246	1.886	247	1.895	248	1.905	249	1.914
250	1.923	251	1.933	252	1.942	253	1.951	254	1.961	255	1.970	256	1.980	257	1.989	258	1.998	259	2.008
260	2.017	261	2.027	262	2.036	263	2.046	264	2.055	265	2.064	266	2.074	267	2.083	268	2.093	269	2.102
270	2.112	271	2.121	272	2.131	273	2.140	274	2.150	275	2.159	276	2.169	277	2.179	278	2.188	279	2.198
280	2.207	281	2.217	282	2.226	283	2.236	284	2.246	285	2.255	286	2.265	287	2.275	288	2.284	289	2.294
290	2.304	291	2.313	292	2.323	293	2.333	294	2.342	295	2.352	296	2.362	297	2.371	298	2.381	299	2.391
300	2.401	301	2.410	302	2.420	303	2.430	304	2.440	305	2.449	306	2.459	307	2.469	308	2.479	309	2.488
310	2.498	311	2.508	312	2.518	313	2.528	314	2.538	315	2.547	316	2.557	317	2.567	318	2.577	319	2.587
320	2.597	321	2.607	322	2.617	323	2.626	324	2.636	325	2.646	326	2.656	327	2.666	328	2.676	329	2.686
330	2.696	331	2.706	332	2.716	333	2.726	334	2.736	335	2.746	336	2.756	337	2.766	338	2.776	339	2.786
340	2.796	341	2.806	342	2.816	343	2.826	344	2.836	345	2.846	346	2.856	347	2.866	348	2.876	349	2.886
350	2.896	351	2.906	352	2.916	353	2.926	354	2.937	355	2.947	356	2.957	357	2.967	358	2.977	359	2.987
360	2.997	361	3.007	362	3.018	363	3.028	364	3.038	365	3.048	366	3.058	367	3.068	368	3.079	369	3.089
370	3.099	371	3.109	372	3.119	373	3.130	374	3.140	375	3.150	376	3.160	377	3.171	378	3.181	379	3.191
380	3.201	381	3.212	382	3.222	383	3.232	384	3.242	385	3.253	386	3.263	387	3.273	388	3.284	389	3.294

Type R Thermocouple

°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV
390	3.304	391	3.315	392	3.325	393	3.335	394	3.346	395	3.356	396	3.366	397	3.377	398	3.387	399	3.397
400	3.408	401	3.418	402	3.428	403	3.439	404	3.449	405	3.460	406	3.470	407	3.480	408	3.491	409	3.501
410	3.512	411	3.522	412	3.533	413	3.543	414	3.553	415	3.564	416	3.574	417	3.585	418	3.595	419	3.606
420	3.616	421	3.627	422	3.637	423	3.648	424	3.658	425	3.669	426	3.679	427	3.690	428	3.700	429	3.711
430	3.721	431	3.732	432	3.742	433	3.753	434	3.764	435	3.774	436	3.785	437	3.795	438	3.806	439	3.816
440	3.827	441	3.838	442	3.848	443	3.859	444	3.869	445	3.880	446	3.891	447	3.901	448	3.912	449	3.922
450	3.933	451	3.944	452	3.954	453	3.965	454	3.976	455	3.986	456	3.997	457	4.008	458	4.018	459	4.029
460	4.040	461	4.050	462	4.061	463	4.072	464	4.083	465	4.093	466	4.104	467	4.115	468	4.125	469	4.136
470	4.147	471	4.158	472	4.168	473	4.179	474	4.190	475	4.201	476	4.211	477	4.222	478	4.233	479	4.244
480	4.255	481	4.265	482	4.276	483	4.287	484	4.298	485	4.309	486	4.319	487	4.330	488	4.341	489	4.352
490	4.363	491	4.373	492	4.384	493	4.395	494	4.406	495	4.417	496	4.428	497	4.439	498	4.449	499	4.460
500	4.471	501	4.482	502	4.493	503	4.504	504	4.515	505	4.526	506	4.537	507	4.548	508	4.558	509	4.569
510	4.580	511	4.591	512	4.602	513	4.613	514	4.624	515	4.635	516	4.646	517	4.657	518	4.668	519	4.679
520	4.690	521	4.701	522	4.712	523	4.723	524	4.734	525	4.745	526	4.756	527	4.767	528	4.778	529	4.789
530	4.800	531	4.811	532	4.822	533	4.833	534	4.844	535	4.855	536	4.866	537	4.877	538	4.888	539	4.899
540	4.910	541	4.922	542	4.933	543	4.944	544	4.955	545	4.966	546	4.977	547	4.988	548	4.999	549	5.010
550	5.021	551	5.033	552	5.044	553	5.055	554	5.066	555	5.077	556	5.088	557	5.099	558	5.111	559	5.122
560	5.133	561	5.144	562	5.155	563	5.166	564	5.178	565	5.189	566	5.200	567	5.211	568	5.222	569	5.234
570	5.245	571	5.256	572	5.267	573	5.279	574	5.290	575	5.301	576	5.312	577	5.323	578	5.335	579	5.346
580	5.357	581	5.369	582	5.380	583	5.391	584	5.402	585	5.414	586	5.425	587	5.436	588	5.448	589	5.459
590	5.470	591	5.481	592	5.493	593	5.504	594	5.515	595	5.527	596	5.538	597	5.549	598	5.561	599	5.572
600	5.583	601	5.595	602	5.606	603	5.618	604	5.629	605	5.640	606	5.652	607	5.663	608	5.674	609	5.686
610	5.697	611	5.709	612	5.720	613	5.731	614	5.743	615	5.754	616	5.766	617	5.777	618	5.789	619	5.800
620	5.812	621	5.823	622	5.834	623	5.846	624	5.857	625	5.869	626	5.880	627	5.892	628	5.903	629	5.915
630	5.926	631	5.938	632	5.949	633	5.961	634	5.972	635	5.984	636	5.995	637	6.007	638	6.018	639	6.030
640	6.041	641	6.053	642	6.065	643	6.076	644	6.088	645	6.099	646	6.111	647	6.122	648	6.134	649	6.146
650	6.157	651	6.169	652	6.180	653	6.192	654	6.204	655	6.215	656	6.227	657	6.238	658	6.250	659	6.262
660	6.273	661	6.285	662	6.297	663	6.308	664	6.320	665	6.332	666	6.343	667	6.355	668	6.367	669	6.378
670	6.390	671	6.402	672	6.413	673	6.425	674	6.437	675	6.448	676	6.460	677	6.472	678	6.484	679	6.495
680	6.507	681	6.519	682	6.531	683	6.542	684	6.554	685	6.566	686	6.578	687	6.589	688	6.601	689	6.613
690	6.625	691	6.636	692	6.648	693	6.660	694	6.672	695	6.684	696	6.695	697	6.707	698	6.719	699	6.731
700	6.743	701	6.755	702	6.766	703	6.778	704	6.790	705	6.802	706	6.814	707	6.826	708	6.838	709	6.849
710	6.861	711	6.873	712	6.885	713	6.897	714	6.909	715	6.921	716	6.933	717	6.945	718	6.956	719	6.968
720	6.980	721	6.992	722	7.004	723	7.016	724	7.028	725	7.040	726	7.052	727	7.064	728	7.076	729	7.088
730	7.100	731	7.112	732	7.124	733	7.136	734	7.148	735	7.160	736	7.172	737	7.184	738	7.196	739	7.208
740	7.220	741	7.232	742	7.244	743	7.256	744	7.268	745	7.280	746	7.292	747	7.304	748	7.316	749	7.328
750	7.340	751	7.352	752	7.364	753	7.376	754	7.389	755	7.401	756	7.413	757	7.425	758	7.437	759	7.449
760	7.461	761	7.473	762	7.485	763	7.498	764	7.510	765	7.522	766	7.534	767	7.546	768	7.558	769	7.570
770	7.583	771	7.595	772	7.607	773	7.619	774	7.631	775	7.644	776	7.656	777	7.668	778	7.680	779	7.692
780	7.705	781	7.717	782	7.729	783	7.741	784	7.753	785	7.766	786	7.778	787	7.790	788	7.802	789	7.815
790	7.827	791	7.839	792	7.851	793	7.864	794	7.876	795	7.888	796	7.901	797	7.913	798	7.925	799	7.938
800	7.950	801	7.962	802	7.974	803	7.987	804	7.999	805	8.011	806	8.024	807	8.036	808	8.048	809	8.061
810	8.073	811	8.086	812	8.098	813	8.110	814	8.123	815	8.135	816	8.147	817	8.160	818	8.172	819	8.185
820	8.197	821	8.209	822	8.222	823	8.234	824	8.247	825	8.259	826	8.272	827	8.284	828	8.296	829	8.309
830	8.321	831	8.334	832	8.346	833	8.359	834	8.371	835	8.384	836	8.396	837	8.409	838	8.421	839	8.434
840	8.446	841	8.459	842	8.471	843	8.484	844	8.496	845	8.509	846	8.521	847	8.534	848	8.546	849	8.559
850	8.571	851	8.584	852	8.597	853	8.609	854	8.622	855	8.634	856	8.647	857	8.659	858	8.672	859	8.685
860	8.697	861	8.710	862	8.722	863	8.735	864	8.748	865	8.760	866	8.773	867	8.785	868	8.798	869	8.811
870	8.823	871	8.836	872	8.849	873	8.861	874	8.874	875	8.887	876	8.899	877	8.912	878	8.925	879	8.937
880	8.950	881	8.963	882	8.975	883	8.988	884	9.001	885	9.014	886	9.026	887	9.039	888	9.052	889	9.065
890	9.077	891	9.090	892	9.103	893	9.115	894	9.128	895	9.141	896	9.154	897	9.167	898	9.179	899	9.192

Type R Thermocouple

°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV
900	9.205	901	9.218	902	9.230	903	9.243	904	9.256	905	9.269	906	9.282	907	9.294	908	9.307	909	9.320
910	9.333	911	9.346	912	9.359	913	9.371	914	9.384	915	9.397	916	9.410	917	9.423	918	9.436	919	9.449
920	9.461	921	9.474	922	9.487	923	9.500	924	9.513	925	9.526	926	9.539	927	9.552	928	9.565	929	9.578
930	9.590	931	9.603	932	9.616	933	9.629	934	9.642	935	9.655	936	9.668	937	9.681	938	9.694	939	9.707
940	9.720	941	9.733	942	9.746	943	9.759	944	9.772	945	9.785	946	9.798	947	9.811	948	9.824	949	9.837
950	9.850	951	9.863	952	9.876	953	9.889	954	9.902	955	9.915	956	9.928	957	9.941	958	9.954	959	9.967
960	9.980	961	9.993	962	10.006	963	10.019	964	10.032	965	10.046	966	10.059	967	10.072	968	10.085	969	10.098
970	10.111	971	10.124	972	10.137	973	10.150	974	10.163	975	10.177	976	10.190	977	10.203	978	10.216	979	10.229
980	10.242	981	10.255	982	10.268	983	10.282	984	10.295	985	10.308	986	10.321	987	10.334	988	10.347	989	10.361
990	10.374	991	10.387	992	10.400	993	10.413	994	10.427	995	10.440	996	10.453	997	10.466	998	10.480	999	10.493
1000	10.506	1001	10.519	1002	10.532	1003	10.546	1004	10.559	1005	10.572	1006	10.585	1007	10.599	1008	10.612	1009	10.625
1010	10.638	1011	10.652	1012	10.665	1013	10.678	1014	10.692	1015	10.705	1016	10.718	1017	10.731	1018	10.745	1019	10.758
1020	10.771	1021	10.785	1022	10.798	1023	10.811	1024	10.825	1025	10.838	1026	10.851	1027	10.865	1028	10.878	1029	10.891
1030	10.905	1031	10.918	1032	10.932	1033	10.945	1034	10.958	1035	10.972	1036	10.985	1037	10.998	1038	11.012	1039	11.025
1040	11.039	1041	11.052	1042	11.065	1043	11.079	1044	11.092	1045	11.106	1046	11.119	1047	11.132	1048	11.146	1049	11.159
1050	11.173	1051	11.186	1052	11.200	1053	11.213	1054	11.227	1055	11.240	1056	11.253	1057	11.267	1058	11.280	1059	11.294
1060	11.307	1061	11.321	1062	11.334	1063	11.348	1064	11.361	1065	11.375	1066	11.388	1067	11.402	1068	11.415	1069	11.429
1070	11.442	1071	11.456	1072	11.469	1073	11.483	1074	11.496	1075	11.510	1076	11.524	1077	11.537	1078	11.551	1079	11.564
1080	11.578	1081	11.591	1082	11.605	1083	11.618	1084	11.632	1085	11.646	1086	11.659	1087	11.673	1088	11.686	1089	11.700
1090	11.714	1091	11.727	1092	11.741	1093	11.754	1094	11.768	1095	11.782	1096	11.795	1097	11.809	1098	11.822	1099	11.836
1100	11.850	1101	11.863	1102	11.877	1103	11.891	1104	11.904	1105	11.918	1106	11.931	1107	11.945	1108	11.959	1109	11.972
1110	11.986	1111	12.000	1112	12.013	1113	12.027	1114	12.041	1115	12.054	1116	12.068	1117	12.082	1118	12.096	1119	12.109
1120	12.123	1121	12.137	1122	12.150	1123	12.164	1124	12.178	1125	12.191	1126	12.205	1127	12.219	1128	12.233	1129	12.246
1130	12.260	1131	12.274	1132	12.288	1133	12.301	1134	12.315	1135	12.329	1136	12.342	1137	12.356	1138	12.370	1139	12.384
1140	12.397	1141	12.411	1142	12.425	1143	12.439	1144	12.453	1145	12.466	1146	12.480	1147	12.494	1148	12.508	1149	12.521
1150	12.535	1151	12.549	1152	12.563	1153	12.577	1154	12.590	1155	12.604	1156	12.618	1157	12.632	1158	12.646	1159	12.659
1160	12.673	1161	12.687	1162	12.701	1163	12.715	1164	12.729	1165	12.742	1166	12.756	1167	12.770	1168	12.784	1169	12.798
1170	12.812	1171	12.825	1172	12.839	1173	12.853	1174	12.867	1175	12.881	1176	12.895	1177	12.909	1178	12.922	1179	12.936
1180	12.950	1181	12.964	1182	12.978	1183	12.992	1184	13.006	1185	13.019	1186	13.033	1187	13.047	1188	13.061	1189	13.075
1190	13.089	1191	13.103	1192	13.117	1193	13.131	1194	13.145	1195	13.158	1196	13.172	1197	13.186	1198	13.200	1199	13.214
1200	13.228	1201	13.242	1202	13.256	1203	13.270	1204	13.284	1205	13.298	1206	13.311	1207	13.325	1208	13.339	1209	13.353
1210	13.367	1211	13.381	1212	13.395	1213	13.409	1214	13.423	1215	13.437	1216	13.451	1217	13.465	1218	13.479	1219	13.493
1220	13.507	1221	13.521	1222	13.535	1223	13.549	1224	13.563	1225	13.577	1226	13.590	1227	13.604	1228	13.618	1229	13.632
1230	13.646	1231	13.660	1232	13.674	1233	13.688	1234	13.702	1235	13.716	1236	13.730	1237	13.744	1238	13.758	1239	13.772
1240	13.786	1241	13.800	1242	13.814	1243	13.828	1244	13.842	1245	13.856	1246	13.870	1247	13.884	1248	13.898	1249	13.912
1250	13.926	1251	13.940	1252	13.954	1253	13.968	1254	13.982	1255	13.996	1256	14.010	1257	14.024	1258	14.038	1259	14.052
1260	14.066	1261	14.081	1262	14.095	1263	14.109	1264	14.123	1265	14.137	1266	14.151	1267	14.165	1268	14.179	1269	14.193
1270	14.207	1271	14.221	1272	14.235	1273	14.249	1274	14.263	1275	14.277	1276	14.291	1277	14.305	1278	14.319	1279	14.333
1280	14.347	1281	14.361	1282	14.375	1283	14.390	1284	14.404	1285	14.418	1286	14.432	1287	14.446	1288	14.460	1289	14.474
1290	14.488	1291	14.502	1292	14.516	1293	14.530	1294	14.544	1295	14.558	1296	14.572	1297	14.586	1298	14.601	1299	14.615
1300	14.629	1301	14.643	1302	14.657	1303	14.671	1304	14.685	1305	14.699	1306	14.713	1307	14.727	1308	14.741	1309	14.755
1310	14.770	1311	14.784	1312	14.798	1313	14.812	1314	14.826	1315	14.840	1316	14.854	1317	14.868	1318	14.882	1319	14.896
1320	14.911	1321	14.925	1322	14.939	1323	14.953	1324	14.967	1325	14.981	1326	14.995	1327	15.009	1328	15.023	1329	15.037
1330	15.052	1331	15.066	1332	15.080	1333	15.094	1334	15.108	1335	15.122	1336	15.136	1337	15.150	1338	15.164	1339	15.179
1340	15.193	1341	15.207	1342	15.221	1343	15.235	1344	15.249	1345	15.263	1346	15.277	1347	15.291	1348	15.306	1349	15.320
1350	15.334	1351	15.348	1352	15.362	1353	15.376	1354	15.390	1355	15.404	1356	15.419	1357	15.433	1358	15.447	1359	15.461
1360	15.475	1361	15.489	1362	15.503	1363	15.517	1364	15.531	1365	15.546	1366	15.560	1367	15.574	1368	15.588	1369	15.602
1370	15.616	1371	15.630	1372	15.645	1373	15.659	1374	15.673	1375	15.687	1376	15.701	1377	15.715	1378	15.729	1379	15.743
1380	15.758	1381	15.772	1382	15.786	1383	15.800	1384	15.814	1385	15.828	1386	15.842	1387	15.856	1388	15.871	1389	15.885
1390	15.899	1391	15.913	1392	15.927	1393	15.941	1394	15.955	1395	15.969	1396	15.984	1397	15.998	1398	16.012	1399	16.026
1400	16.040	1401	16.054	1402	16.068	1403	16.082	1404	16.097	1405	16.111	1406	16.125	1407	16.139	1408	16.153	1409	16.167

Type R Thermocouple

°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV
1410	16.181	1411	16.196	1412	16.210	1413	16.224	1414	16.238	1415	16.252	1416	16.266	1417	16.280	1418	16.294	1419	16.309
1420	16.323	1421	16.337	1422	16.351	1423	16.365	1424	16.379	1425	16.393	1426	16.407	1427	16.422	1428	16.436	1429	16.450
1430	16.464	1431	16.478	1432	16.492	1433	16.506	1434	16.520	1435	16.534	1436	16.549	1437	16.563	1438	16.577	1439	16.591
1440	16.605	1441	16.619	1442	16.633	1443	16.647	1444	16.662	1445	16.676	1446	16.690	1447	16.704	1448	16.718	1449	16.732
1450	16.746	1451	16.760	1452	16.774	1453	16.789	1454	16.803	1455	16.817	1456	16.831	1457	16.845	1458	16.859	1459	16.873
1460	16.887	1461	16.901	1462	16.915	1463	16.930	1464	16.944	1465	16.958	1466	16.972	1467	16.986	1468	17.000	1469	17.014
1470	17.028	1471	17.042	1472	17.056	1473	17.071	1474	17.085	1475	17.099	1476	17.113	1477	17.127	1478	17.141	1479	17.155
1480	17.169	1481	17.183	1482	17.197	1483	17.211	1484	17.225	1485	17.240	1486	17.254	1487	17.268	1488	17.282	1489	17.296
1490	17.310	1491	17.324	1492	17.338	1493	17.352	1494	17.366	1495	17.380	1496	17.394	1497	17.408	1498	17.423	1499	17.437
1500	17.451	1501	17.465	1502	17.479	1503	17.493	1504	17.507	1505	17.521	1506	17.535	1507	17.549	1508	17.563	1509	17.577
1510	17.591	1511	17.605	1512	17.619	1513	17.633	1514	17.647	1515	17.661	1516	17.676	1517	17.690	1518	17.704	1519	17.718
1520	17.732	1521	17.746	1522	17.760	1523	17.774	1524	17.788	1525	17.802	1526	17.816	1527	17.830	1528	17.844	1529	17.858
1530	17.872	1531	17.886	1532	17.900	1533	17.914	1534	17.928	1535	17.942	1536	17.956	1537	17.970	1538	17.984	1539	17.998
1540	18.012	1541	18.026	1542	18.040	1543	18.054	1544	18.068	1545	18.082	1546	18.096	1547	18.110	1548	18.124	1549	18.138
1550	18.152	1551	18.166	1552	18.180	1553	18.194	1554	18.208	1555	18.222	1556	18.236	1557	18.250	1558	18.264	1559	18.278
1560	18.292	1561	18.306	1562	18.320	1563	18.334	1564	18.348	1565	18.362	1566	18.376	1567	18.390	1568	18.404	1569	18.417
1570	18.431	1571	18.445	1572	18.459	1573	18.473	1574	18.487	1575	18.501	1576	18.515	1577	18.529	1578	18.543	1579	18.557
1580	18.571	1581	18.585	1582	18.599	1583	18.613	1584	18.627	1585	18.640	1586	18.654	1587	18.668	1588	18.682	1589	18.696
1590	18.710	1591	18.724	1592	18.738	1593	18.752	1594	18.766	1595	18.779	1596	18.793	1597	18.807	1598	18.821	1599	18.835
1600	18.849	1601	18.863	1602	18.877	1603	18.891	1604	18.904	1605	18.918	1606	18.932	1607	18.946	1608	18.960	1609	18.974
1610	18.988	1611	19.002	1612	19.015	1613	19.029	1614	19.043	1615	19.057	1616	19.071	1617	19.085	1618	19.098	1619	19.112
1620	19.126	1621	19.140	1622	19.154	1623	19.168	1624	19.181	1625	19.195	1626	19.209	1627	19.223	1628	19.237	1629	19.250
1630	19.264	1631	19.278	1632	19.292	1633	19.306	1634	19.319	1635	19.333	1636	19.347	1637	19.361	1638	19.375	1639	19.388
1640	19.402	1641	19.416	1642	19.430	1643	19.444	1644	19.457	1645	19.471	1646	19.485	1647	19.499	1648	19.512	1649	19.526
1650	19.540	1651	19.554	1652	19.567	1653	19.581	1654	19.595	1655	19.609	1656	19.622	1657	19.636	1658	19.650	1659	19.663
1660	19.677	1661	19.691	1662	19.705	1663	19.718	1664	19.732	1665	19.746	1666	19.759	1667	19.773	1668	19.787	1669	19.800
1670	19.814	1671	19.828	1672	19.841	1673	19.855	1674	19.869	1675	19.882	1676	19.896	1677	19.910	1678	19.923	1679	19.937
1680	19.951	1681	19.964	1682	19.978	1683	19.992	1684	20.005	1685	20.019	1686	20.032	1687	20.046	1688	20.060	1689	20.073
1690	20.087	1691	20.100	1692	20.114	1693	20.127	1694	20.141	1695	20.154	1696	20.168	1697	20.181	1698	20.195	1699	20.208
1700	20.222	1701	20.235	1702	20.249	1703	20.262	1704	20.275	1705	20.289	1706	20.302	1707	20.316	1708	20.329	1709	20.342
1710	20.356	1711	20.369	1712	20.382	1713	20.396	1714	20.409	1715	20.422	1716	20.436	1717	20.449	1718	20.462	1719	20.475
1720	20.488	1721	20.502	1722	20.515	1723	20.528	1724	20.541	1725	20.554	1726	20.567	1727	20.581	1728	20.594	1729	20.607
1730	20.620	1731	20.633	1732	20.646	1733	20.659	1734	20.672	1735	20.685	1736	20.698	1737	20.711	1738	20.724	1739	20.736
1740	20.749	1741	20.762	1742	20.775	1743	20.788	1744	20.801	1745	20.813	1746	20.826	1747	20.839	1748	20.852	1749	20.864
1750	20.877	1751	20.890	1752	20.902	1753	20.915	1754	20.928	1755	20.940	1756	20.953	1757	20.965	1758	20.978	1759	20.990
1760	21.003																		

Table 7 *Type R Thermocouple –50°F to 3210°F vs milliVolts*

Type R Thermocouple																				
°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
–50	–0.210	–49	–0.208	–48	–0.205	–47	–0.203	–46	–0.201	–45	–0.199	–44	–0.197	–43	–0.194	–42	–0.192	–41	–0.190
–40	–0.188	–39	–0.185	–38	–0.183	–37	–0.181	–36	–0.179	–35	–0.176	–34	–0.174	–33	–0.172	–32	–0.169	–31	–0.167
–30	–0.165	–29	–0.162	–28	–0.160	–27	–0.158	–26	–0.155	–25	–0.153	–24	–0.150	–23	–0.148	–22	–0.145	–21	–0.143
–20	–0.141	–19	–0.138	–18	–0.136	–17	–0.133	–16	–0.131	–15	–0.128	–14	–0.126	–13	–0.123	–12	–0.121	–11	–0.118
–10	–0.116	–9	–0.113	–8	–0.110	–7	–0.108	–6	–0.105	–5	–0.103	–4	–0.100	–3	–0.097	–2	–0.095	–1	–0.092
0	–0.090	1	–0.087	2	–0.084	3	–0.082	4	–0.079	5	–0.076	6	–0.073	7	–0.071	8	–0.068	9	–0.065
10	–0.063	11	–0.060	12	–0.057	13	–0.054	14	–0.051	15	–0.049	16	–0.046	17	–0.043	18	–0.040	19	–0.037
20	–0.035	21	–0.032	22	–0.029	23	–0.026	24	–0.023	25	–0.020	26	–0.017	27	–0.015	28	–0.012	29	–0.009
30	–0.006	31	–0.003	32	0.000	33	0.003	34	0.006	35	0.009	36	0.012	37	0.015	38	0.018	39	0.021
40	0.024	41	0.027	42	0.030	43	0.033	44	0.036	45	0.039	46	0.042	47	0.045	48	0.048	49	0.051
50	0.054	51	0.057	52	0.060	53	0.064	54	0.067	55	0.070	56	0.073	57	0.076	58	0.079	59	0.082
60	0.086	61	0.089	62	0.092	63	0.095	64	0.098	65	0.102	66	0.105	67	0.108	68	0.111	69	0.114
70	0.118	71	0.121	72	0.124	73	0.127	74	0.131	75	0.134	76	0.137	77	0.141	78	0.144	79	0.147
80	0.151	81	0.154	82	0.157	83	0.161	84	0.164	85	0.167	86	0.171	87	0.174	88	0.177	89	0.181
90	0.184	91	0.188	92	0.191	93	0.194	94	0.198	95	0.201	96	0.205	97	0.208	98	0.212	99	0.215
100	0.218	101	0.222	102	0.225	103	0.229	104	0.232	105	0.236	106	0.239	107	0.243	108	0.246	109	0.250
110	0.254	111	0.257	112	0.261	113	0.264	114	0.268	115	0.271	116	0.275	117	0.278	118	0.282	119	0.286
120	0.289	121	0.293	122	0.296	123	0.300	124	0.304	125	0.307	126	0.311	127	0.315	128	0.318	129	0.322
130	0.326	131	0.329	132	0.333	133	0.337	134	0.340	135	0.344	136	0.348	137	0.352	138	0.355	139	0.359
140	0.363	141	0.366	142	0.370	143	0.374	144	0.378	145	0.382	146	0.385	147	0.389	148	0.393	149	0.397
150	0.400	151	0.404	152	0.408	153	0.412	154	0.416	155	0.420	156	0.423	157	0.427	158	0.431	159	0.435
160	0.439	161	0.443	162	0.447	163	0.450	164	0.454	165	0.458	166	0.462	167	0.466	168	0.470	169	0.474
170	0.478	171	0.482	172	0.486	173	0.489	174	0.493	175	0.497	176	0.501	177	0.505	178	0.509	179	0.513
180	0.517	181	0.521	182	0.525	183	0.529	184	0.533	185	0.537	186	0.541	187	0.545	188	0.549	189	0.553
190	0.557	191	0.561	192	0.565	193	0.569	194	0.573	195	0.578	196	0.582	197	0.586	198	0.590	199	0.594
200	0.598	201	0.602	202	0.606	203	0.610	204	0.614	205	0.618	206	0.623	207	0.627	208	0.631	209	0.635
210	0.639	211	0.643	212	0.647	213	0.652	214	0.656	215	0.660	216	0.664	217	0.668	218	0.672	219	0.677
220	0.681	221	0.685	222	0.689	223	0.693	224	0.698	225	0.702	226	0.706	227	0.710	228	0.715	229	0.719
230	0.723	231	0.727	232	0.732	233	0.736	234	0.740	235	0.744	236	0.749	237	0.753	238	0.757	239	0.761
240	0.766	241	0.770	242	0.774	243	0.779	244	0.783	245	0.787	246	0.792	247	0.796	248	0.800	249	0.805
250	0.809	251	0.813	252	0.818	253	0.822	254	0.826	255	0.831	256	0.835	257	0.839	258	0.844	259	0.848
260	0.853	261	0.857	262	0.861	263	0.866	264	0.870	265	0.875	266	0.879	267	0.883	268	0.888	269	0.892
270	0.897	271	0.901	272	0.906	273	0.910	274	0.915	275	0.919	276	0.923	277	0.928	278	0.932	279	0.937
280	0.941	281	0.946	282	0.950	283	0.955	284	0.959	285	0.964	286	0.968	287	0.973	288	0.977	289	0.982
290	0.986	291	0.991	292	0.995	293	1.000	294	1.005	295	1.009	296	1.014	297	1.018	298	1.023	299	1.027

Type R Thermocouple

°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
300	1.032	301	1.036	302	1.041	303	1.046	304	1.050	305	1.055	306	1.059	307	1.064	308	1.069	309	1.073
310	1.078	311	1.082	312	1.087	313	1.092	314	1.096	315	1.101	316	1.105	317	1.110	318	1.115	319	1.119
320	1.124	321	1.129	322	1.133	323	1.138	324	1.143	325	1.147	326	1.152	327	1.157	328	1.161	329	1.166
330	1.171	331	1.175	332	1.180	333	1.185	334	1.190	335	1.194	336	1.199	337	1.204	338	1.208	339	1.213
340	1.218	341	1.223	342	1.227	343	1.232	344	1.237	345	1.242	346	1.246	347	1.251	348	1.256	349	1.261
350	1.265	351	1.270	352	1.275	353	1.280	354	1.284	355	1.289	356	1.294	357	1.299	358	1.304	359	1.308
360	1.313	361	1.318	362	1.323	363	1.328	364	1.332	365	1.337	366	1.342	367	1.347	368	1.352	369	1.356
370	1.361	371	1.366	372	1.371	373	1.376	374	1.381	375	1.386	376	1.390	377	1.395	378	1.400	379	1.405
380	1.410	381	1.415	382	1.420	383	1.425	384	1.429	385	1.434	386	1.439	387	1.444	388	1.449	389	1.454
390	1.459	391	1.464	392	1.469	393	1.473	394	1.478	395	1.483	396	1.488	397	1.493	398	1.498	399	1.503
400	1.508	401	1.513	402	1.518	403	1.523	404	1.528	405	1.533	406	1.538	407	1.543	408	1.548	409	1.553
410	1.558	411	1.563	412	1.568	413	1.572	414	1.577	415	1.582	416	1.587	417	1.592	418	1.597	419	1.602
420	1.607	421	1.612	422	1.617	423	1.622	424	1.627	425	1.632	426	1.638	427	1.643	428	1.648	429	1.653
430	1.658	431	1.663	432	1.668	433	1.673	434	1.678	435	1.683	436	1.688	437	1.693	438	1.698	439	1.703
440	1.708	441	1.713	442	1.718	443	1.723	444	1.728	445	1.733	446	1.739	447	1.744	448	1.749	449	1.754
450	1.759	451	1.764	452	1.769	453	1.774	454	1.779	455	1.784	456	1.790	457	1.795	458	1.800	459	1.805
460	1.810	461	1.815	462	1.820	463	1.825	464	1.831	465	1.836	466	1.841	467	1.846	468	1.851	469	1.856
470	1.861	471	1.867	472	1.872	473	1.877	474	1.882	475	1.887	476	1.892	477	1.898	478	1.903	479	1.908
480	1.913	481	1.918	482	1.923	483	1.929	484	1.934	485	1.939	486	1.944	487	1.949	488	1.955	489	1.960
490	1.965	491	1.970	492	1.975	493	1.981	494	1.986	495	1.991	496	1.996	497	2.002	498	2.007	499	2.012
500	2.017	501	2.022	502	2.028	503	2.033	504	2.038	505	2.043	506	2.049	507	2.054	508	2.059	509	2.064
510	2.070	511	2.075	512	2.080	513	2.085	514	2.091	515	2.096	516	2.101	517	2.107	518	2.112	519	2.117
520	2.122	521	2.128	522	2.133	523	2.138	524	2.144	525	2.149	526	2.154	527	2.159	528	2.165	529	2.170
530	2.175	531	2.181	532	2.186	533	2.191	534	2.197	535	2.202	536	2.207	537	2.213	538	2.218	539	2.223
540	2.229	541	2.234	542	2.239	543	2.245	544	2.250	545	2.255	546	2.261	547	2.266	548	2.271	549	2.277
550	2.282	551	2.287	552	2.293	553	2.298	554	2.304	555	2.309	556	2.314	557	2.320	558	2.325	559	2.330
560	2.336	561	2.341	562	2.347	563	2.352	564	2.357	565	2.363	566	2.368	567	2.374	568	2.379	569	2.384
570	2.390	571	2.395	572	2.401	573	2.406	574	2.411	575	2.417	576	2.422	577	2.428	578	2.433	579	2.438
580	2.444	581	2.449	582	2.455	583	2.460	584	2.466	585	2.471	586	2.477	587	2.482	588	2.487	589	2.493
590	2.498	591	2.504	592	2.509	593	2.515	594	2.520	595	2.526	596	2.531	597	2.537	598	2.542	599	2.547
600	2.553	601	2.558	602	2.564	603	2.569	604	2.575	605	2.580	606	2.586	607	2.591	608	2.597	609	2.602
610	2.608	611	2.613	612	2.619	613	2.624	614	2.630	615	2.635	616	2.641	617	2.646	618	2.652	619	2.657
620	2.663	621	2.668	622	2.674	623	2.679	624	2.685	625	2.690	626	2.696	627	2.701	628	2.707	629	2.713
630	2.718	631	2.724	632	2.729	633	2.735	634	2.740	635	2.746	636	2.751	637	2.757	638	2.762	639	2.768
640	2.773	641	2.779	642	2.785	643	2.790	644	2.796	645	2.801	646	2.807	647	2.812	648	2.818	649	2.824
650	2.829	651	2.835	652	2.840	653	2.846	654	2.851	655	2.857	656	2.863	657	2.868	658	2.874	659	2.879
660	2.885	661	2.891	662	2.896	663	2.902	664	2.907	665	2.913	666	2.919	667	2.924	668	2.930	669	2.935
670	2.941	671	2.947	672	2.952	673	2.958	674	2.964	675	2.969	676	2.975	677	2.980	678	2.986	679	2.992
680	2.997	681	3.003	682	3.009	683	3.014	684	3.020	685	3.026	686	3.031	687	3.037	688	3.042	689	3.048

Type R Thermocouple

°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
690	3.054	691	3.059	692	3.065	693	3.071	694	3.076	695	3.082	696	3.088	697	3.093	698	3.099	699	3.105
700	3.110	701	3.116	702	3.122	703	3.127	704	3.133	705	3.139	706	3.144	707	3.150	708	3.156	709	3.161
710	3.167	711	3.173	712	3.179	713	3.184	714	3.190	715	3.196	716	3.201	717	3.207	718	3.213	719	3.218
720	3.224	721	3.230	722	3.236	723	3.241	724	3.247	725	3.253	726	3.258	727	3.264	728	3.270	729	3.276
730	3.281	731	3.287	732	3.293	733	3.298	734	3.304	735	3.310	736	3.316	737	3.321	738	3.327	739	3.333
740	3.339	741	3.344	742	3.350	743	3.356	744	3.362	745	3.367	746	3.373	747	3.379	748	3.385	749	3.390
750	3.396	751	3.402	752	3.408	753	3.413	754	3.419	755	3.425	756	3.431	757	3.437	758	3.442	759	3.448
760	3.454	761	3.460	762	3.465	763	3.471	764	3.477	765	3.483	766	3.489	767	3.494	768	3.500	769	3.506
770	3.512	771	3.517	772	3.523	773	3.529	774	3.535	775	3.541	776	3.546	777	3.552	778	3.558	779	3.564
780	3.570	781	3.576	782	3.581	783	3.587	784	3.593	785	3.599	786	3.605	787	3.610	788	3.616	789	3.622
790	3.628	791	3.634	792	3.640	793	3.645	794	3.651	795	3.657	796	3.663	797	3.669	798	3.675	799	3.680
800	3.686	801	3.692	802	3.698	803	3.704	804	3.710	805	3.716	806	3.721	807	3.727	808	3.733	809	3.739
810	3.745	811	3.751	812	3.757	813	3.762	814	3.768	815	3.774	816	3.780	817	3.786	818	3.792	819	3.798
820	3.803	821	3.809	822	3.815	823	3.821	824	3.827	825	3.833	826	3.839	827	3.845	828	3.851	829	3.856
830	3.862	831	3.868	832	3.874	833	3.880	834	3.886	835	3.892	836	3.898	837	3.904	838	3.909	839	3.915
840	3.921	841	3.927	842	3.933	843	3.939	844	3.945	845	3.951	846	3.957	847	3.963	848	3.969	849	3.975
850	3.980	851	3.986	852	3.992	853	3.998	854	4.004	855	4.010	856	4.016	857	4.022	858	4.028	859	4.034
860	4.040	861	4.046	862	4.052	863	4.058	864	4.064	865	4.069	866	4.075	867	4.081	868	4.087	869	4.093
870	4.099	871	4.105	872	4.111	873	4.117	874	4.123	875	4.129	876	4.135	877	4.141	878	4.147	879	4.153
880	4.159	881	4.165	882	4.171	883	4.177	884	4.183	885	4.189	886	4.195	887	4.201	888	4.207	889	4.213
890	4.219	891	4.225	892	4.231	893	4.237	894	4.243	895	4.249	896	4.255	897	4.261	898	4.267	899	4.273
900	4.279	901	4.285	902	4.291	903	4.297	904	4.303	905	4.309	906	4.315	907	4.321	908	4.327	909	4.333
910	4.339	911	4.345	912	4.351	913	4.357	914	4.363	915	4.369	916	4.375	917	4.381	918	4.387	919	4.393
920	4.399	921	4.405	922	4.411	923	4.417	924	4.423	925	4.429	926	4.435	927	4.441	928	4.447	929	4.453
930	4.459	931	4.465	932	4.471	933	4.477	934	4.483	935	4.489	936	4.495	937	4.502	938	4.508	939	4.514
940	4.520	941	4.526	942	4.532	943	4.538	944	4.544	945	4.550	946	4.556	947	4.562	948	4.568	949	4.574
950	4.580	951	4.586	952	4.593	953	4.599	954	4.605	955	4.611	956	4.617	957	4.623	958	4.629	959	4.635
960	4.641	961	4.647	962	4.653	963	4.659	964	4.666	965	4.672	966	4.678	967	4.684	968	4.690	969	4.696
970	4.702	971	4.708	972	4.714	973	4.720	974	4.727	975	4.733	976	4.739	977	4.745	978	4.751	979	4.757
980	4.763	981	4.769	982	4.775	983	4.782	984	4.788	985	4.794	986	4.800	987	4.806	988	4.812	989	4.818
990	4.824	991	4.831	992	4.837	993	4.843	994	4.849	995	4.855	996	4.861	997	4.867	998	4.874	999	4.880
1000	4.886	1001	4.892	1002	4.898	1003	4.904	1004	4.910	1005	4.917	1006	4.923	1007	4.929	1008	4.935	1009	4.941
1010	4.947	1011	4.954	1012	4.960	1013	4.966	1014	4.972	1015	4.978	1016	4.984	1017	4.991	1018	4.997	1019	5.003
1020	5.009	1021	5.015	1022	5.021	1023	5.028	1024	5.034	1025	5.040	1026	5.046	1027	5.052	1028	5.059	1029	5.065
1030	5.071	1031	5.077	1032	5.083	1033	5.090	1034	5.096	1035	5.102	1036	5.108	1037	5.114	1038	5.121	1039	5.127
1040	5.133	1041	5.139	1042	5.145	1043	5.152	1044	5.158	1045	5.164	1046	5.170	1047	5.176	1048	5.183	1049	5.189
1050	5.195	1051	5.201	1052	5.207	1053	5.214	1054	5.220	1055	5.226	1056	5.232	1057	5.239	1058	5.245	1059	5.251
1060	5.257	1061	5.264	1062	5.270	1063	5.276	1064	5.282	1065	5.289	1066	5.295	1067	5.301	1068	5.307	1069	5.313
1070	5.320	1071	5.326	1072	5.332	1073	5.338	1074	5.345	1075	5.351	1076	5.357	1077	5.364	1078	5.370	1079	5.376

Type R Thermocouple

°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
1080	5.382	1081	5.389	1082	5.395	1083	5.401	1084	5.407	1085	5.414	1086	5.420	1087	5.426	1088	5.432	1089	5.439
1090	5.445	1091	5.451	1092	5.458	1093	5.464	1094	5.470	1095	5.476	1096	5.483	1097	5.489	1098	5.495	1099	5.502
1100	5.508	1101	5.514	1102	5.520	1103	5.527	1104	5.533	1105	5.539	1106	5.546	1107	5.552	1108	5.558	1109	5.565
1110	5.571	1111	5.577	1112	5.583	1113	5.590	1114	5.596	1115	5.602	1116	5.609	1117	5.615	1118	5.621	1119	5.628
1120	5.634	1121	5.640	1122	5.647	1123	5.653	1124	5.659	1125	5.666	1126	5.672	1127	5.678	1128	5.685	1129	5.691
1130	5.697	1131	5.704	1132	5.710	1133	5.716	1134	5.723	1135	5.729	1136	5.735	1137	5.742	1138	5.748	1139	5.754
1140	5.761	1141	5.767	1142	5.773	1143	5.780	1144	5.786	1145	5.792	1146	5.799	1147	5.805	1148	5.812	1149	5.818
1150	5.824	1151	5.831	1152	5.837	1153	5.843	1154	5.850	1155	5.856	1156	5.862	1157	5.869	1158	5.875	1159	5.882
1160	5.888	1161	5.894	1162	5.901	1163	5.907	1164	5.913	1165	5.920	1166	5.926	1167	5.933	1168	5.939	1169	5.945
1170	5.952	1171	5.958	1172	5.965	1173	5.971	1174	5.977	1175	5.984	1176	5.990	1177	5.997	1178	6.003	1179	6.009
1180	6.016	1181	6.022	1182	6.029	1183	6.035	1184	6.041	1185	6.048	1186	6.054	1187	6.061	1188	6.067	1189	6.074
1190	6.080	1191	6.086	1192	6.093	1193	6.099	1194	6.106	1195	6.112	1196	6.119	1197	6.125	1198	6.131	1199	6.138
1200	6.144	1201	6.151	1202	6.157	1203	6.164	1204	6.170	1205	6.176	1206	6.183	1207	6.189	1208	6.196	1209	6.202
1210	6.209	1211	6.215	1212	6.222	1213	6.228	1214	6.235	1215	6.241	1216	6.247	1217	6.254	1218	6.260	1219	6.267
1220	6.273	1221	6.280	1222	6.286	1223	6.293	1224	6.299	1225	6.306	1226	6.312	1227	6.319	1228	6.325	1229	6.332
1230	6.338	1231	6.345	1232	6.351	1233	6.358	1234	6.364	1235	6.370	1236	6.377	1237	6.383	1238	6.390	1239	6.396
1240	6.403	1241	6.409	1242	6.416	1243	6.422	1244	6.429	1245	6.435	1246	6.442	1247	6.448	1248	6.455	1249	6.461
1250	6.468	1251	6.474	1252	6.481	1253	6.488	1254	6.494	1255	6.501	1256	6.507	1257	6.514	1258	6.520	1259	6.527
1260	6.533	1261	6.540	1262	6.546	1263	6.553	1264	6.559	1265	6.566	1266	6.572	1267	6.579	1268	6.585	1269	6.592
1270	6.598	1271	6.605	1272	6.612	1273	6.618	1274	6.625	1275	6.631	1276	6.638	1277	6.644	1278	6.651	1279	6.657
1280	6.664	1281	6.671	1282	6.677	1283	6.684	1284	6.690	1285	6.697	1286	6.703	1287	6.710	1288	6.716	1289	6.723
1290	6.730	1291	6.736	1292	6.743	1293	6.749	1294	6.756	1295	6.762	1296	6.769	1297	6.776	1298	6.782	1299	6.789
1300	6.795	1301	6.802	1302	6.809	1303	6.815	1304	6.822	1305	6.828	1306	6.835	1307	6.841	1308	6.848	1309	6.855
1310	6.861	1311	6.868	1312	6.874	1313	6.881	1314	6.888	1315	6.894	1316	6.901	1317	6.907	1318	6.914	1319	6.921
1320	6.927	1321	6.934	1322	6.941	1323	6.947	1324	6.954	1325	6.960	1326	6.967	1327	6.974	1328	6.980	1329	6.987
1330	6.994	1331	7.000	1332	7.007	1333	7.013	1334	7.020	1335	7.027	1336	7.033	1337	7.040	1338	7.047	1339	7.053
1340	7.060	1341	7.067	1342	7.073	1343	7.080	1344	7.086	1345	7.093	1346	7.100	1347	7.106	1348	7.113	1349	7.120
1350	7.126	1351	7.133	1352	7.140	1353	7.146	1354	7.153	1355	7.160	1356	7.166	1357	7.173	1358	7.180	1359	7.186
1360	7.193	1361	7.200	1362	7.206	1363	7.213	1364	7.220	1365	7.226	1366	7.233	1367	7.240	1368	7.247	1369	7.253
1370	7.260	1371	7.267	1372	7.273	1373	7.280	1374	7.287	1375	7.293	1376	7.300	1377	7.307	1378	7.313	1379	7.320
1380	7.327	1381	7.334	1382	7.340	1383	7.347	1384	7.354	1385	7.360	1386	7.367	1387	7.374	1388	7.381	1389	7.387
1390	7.394	1391	7.401	1392	7.407	1393	7.414	1394	7.421	1395	7.428	1396	7.434	1397	7.441	1398	7.448	1399	7.454
1400	7.461	1401	7.468	1402	7.475	1403	7.481	1404	7.488	1405	7.495	1406	7.502	1407	7.508	1408	7.515	1409	7.522
1410	7.529	1411	7.535	1412	7.542	1413	7.549	1414	7.556	1415	7.562	1416	7.569	1417	7.576	1418	7.583	1419	7.589
1420	7.596	1421	7.603	1422	7.610	1423	7.616	1424	7.623	1425	7.630	1426	7.637	1427	7.644	1428	7.650	1429	7.657
1430	7.664	1431	7.671	1432	7.677	1433	7.684	1434	7.691	1435	7.698	1436	7.705	1437	7.711	1438	7.718	1439	7.725
1440	7.732	1441	7.739	1442	7.745	1443	7.752	1444	7.759	1445	7.766	1446	7.772	1447	7.779	1448	7.786	1449	7.793
1450	7.800	1451	7.807	1452	7.813	1453	7.820	1454	7.827	1455	7.834	1456	7.841	1457	7.847	1458	7.854	1459	7.861
1460	7.868	1461	7.875	1462	7.882	1463	7.888	1464	7.895	1465	7.902	1466	7.909	1467	7.916	1468	7.922	1469	7.929

Type R Thermocouple

°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
1470	7.936	1471	7.943	1472	7.950	1473	7.957	1474	7.964	1475	7.970	1476	7.977	1477	7.984	1478	7.991	1479	7.998
1480	8.005	1481	8.011	1482	8.018	1483	8.025	1484	8.032	1485	8.039	1486	8.046	1487	8.053	1488	8.059	1489	8.066
1490	8.073	1491	8.080	1492	8.087	1493	8.094	1494	8.101	1495	8.108	1496	8.114	1497	8.121	1498	8.128	1499	8.135
1500	8.142	1501	8.149	1502	8.156	1503	8.163	1504	8.169	1505	8.176	1506	8.183	1507	8.190	1508	8.197	1509	8.204
1510	8.211	1511	8.218	1512	8.225	1513	8.232	1514	8.238	1515	8.245	1516	8.252	1517	8.259	1518	8.266	1519	8.273
1520	8.280	1521	8.287	1522	8.294	1523	8.301	1524	8.308	1525	8.314	1526	8.321	1527	8.328	1528	8.335	1529	8.342
1530	8.349	1531	8.356	1532	8.363	1533	8.370	1534	8.377	1535	8.384	1536	8.391	1537	8.398	1538	8.405	1539	8.411
1540	8.418	1541	8.425	1542	8.432	1543	8.439	1544	8.446	1545	8.453	1546	8.460	1547	8.467	1548	8.474	1549	8.481
1550	8.488	1551	8.495	1552	8.502	1553	8.509	1554	8.516	1555	8.523	1556	8.530	1557	8.537	1558	8.544	1559	8.551
1560	8.557	1561	8.564	1562	8.571	1563	8.578	1564	8.585	1565	8.592	1566	8.599	1567	8.606	1568	8.613	1569	8.620
1570	8.627	1571	8.634	1572	8.641	1573	8.648	1574	8.655	1575	8.662	1576	8.669	1577	8.676	1578	8.683	1579	8.690
1580	8.697	1581	8.704	1582	8.711	1583	8.718	1584	8.725	1585	8.732	1586	8.739	1587	8.746	1588	8.753	1589	8.760
1590	8.767	1591	8.774	1592	8.781	1593	8.788	1594	8.795	1595	8.802	1596	8.809	1597	8.816	1598	8.823	1599	8.830
1600	8.837	1601	8.844	1602	8.852	1603	8.859	1604	8.866	1605	8.873	1606	8.880	1607	8.887	1608	8.894	1609	8.901
1610	8.908	1611	8.915	1612	8.922	1613	8.929	1614	8.936	1615	8.943	1616	8.950	1617	8.957	1618	8.964	1619	8.971
1620	8.978	1621	8.985	1622	8.992	1623	8.999	1624	9.007	1625	9.014	1626	9.021	1627	9.028	1628	9.035	1629	9.042
1630	9.049	1631	9.056	1632	9.063	1633	9.070	1634	9.077	1635	9.084	1636	9.091	1637	9.098	1638	9.106	1639	9.113
1640	9.120	1641	9.127	1642	9.134	1643	9.141	1644	9.148	1645	9.155	1646	9.162	1647	9.169	1648	9.176	1649	9.184
1650	9.191	1651	9.198	1652	9.205	1653	9.212	1654	9.219	1655	9.226	1656	9.233	1657	9.240	1658	9.248	1659	9.255
1660	9.262	1661	9.269	1662	9.276	1663	9.283	1664	9.290	1665	9.297	1666	9.304	1667	9.312	1668	9.319	1669	9.326
1670	9.333	1671	9.340	1672	9.347	1673	9.354	1674	9.361	1675	9.369	1676	9.376	1677	9.383	1678	9.390	1679	9.397
1680	9.404	1681	9.411	1682	9.419	1683	9.426	1684	9.433	1685	9.440	1686	9.447	1687	9.454	1688	9.461	1689	9.469
1690	9.476	1691	9.483	1692	9.490	1693	9.497	1694	9.504	1695	9.512	1696	9.519	1697	9.526	1698	9.533	1699	9.540
1700	9.547	1701	9.555	1702	9.562	1703	9.569	1704	9.576	1705	9.583	1706	9.590	1707	9.598	1708	9.605	1709	9.612
1710	9.619	1711	9.626	1712	9.634	1713	9.641	1714	9.648	1715	9.655	1716	9.662	1717	9.670	1718	9.677	1719	9.684
1720	9.691	1721	9.698	1722	9.706	1723	9.713	1724	9.720	1725	9.727	1726	9.734	1727	9.742	1728	9.749	1729	9.756
1730	9.763	1731	9.770	1732	9.778	1733	9.785	1734	9.792	1735	9.799	1736	9.806	1737	9.814	1738	9.821	1739	9.828
1740	9.835	1741	9.843	1742	9.850	1743	9.857	1744	9.864	1745	9.872	1746	9.879	1747	9.886	1748	9.893	1749	9.900
1750	9.908	1751	9.915	1752	9.922	1753	9.929	1754	9.937	1755	9.944	1756	9.951	1757	9.958	1758	9.966	1759	9.973
1760	9.980	1761	9.987	1762	9.995	1763	10.002	1764	10.009	1765	10.016	1766	10.024	1767	10.031	1768	10.038	1769	10.046
1770	10.053	1771	10.060	1772	10.067	1773	10.075	1774	10.082	1775	10.089	1776	10.096	1777	10.104	1778	10.111	1779	10.118
1780	10.126	1781	10.133	1782	10.140	1783	10.147	1784	10.155	1785	10.162	1786	10.169	1787	10.177	1788	10.184	1789	10.191
1790	10.198	1791	10.206	1792	10.213	1793	10.220	1794	10.228	1795	10.235	1796	10.242	1797	10.250	1798	10.257	1799	10.264
1800	10.271	1801	10.279	1802	10.286	1803	10.293	1804	10.301	1805	10.308	1806	10.315	1807	10.323	1808	10.330	1809	10.337
1810	10.345	1811	10.352	1812	10.359	1813	10.367	1814	10.374	1815	10.381	1816	10.389	1817	10.396	1818	10.403	1819	10.411
1820	10.418	1821	10.425	1822	10.433	1823	10.440	1824	10.447	1825	10.455	1826	10.462	1827	10.469	1828	10.477	1829	10.484
1830	10.491	1831	10.499	1832	10.506	1833	10.513	1834	10.521	1835	10.528	1836	10.535	1837	10.543	1838	10.550	1839	10.557
1840	10.565	1841	10.572	1842	10.580	1843	10.587	1844	10.594	1845	10.602	1846	10.609	1847	10.616	1848	10.624	1849	10.631
1850	10.638	1851	10.646	1852	10.653	1853	10.661	1854	10.668	1855	10.675	1856	10.683	1857	10.690	1858	10.698	1859	10.705

Type R Thermocouple

°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
1860	10.712	1861	10.720	1862	10.727	1863	10.734	1864	10.742	1865	10.749	1866	10.757	1867	10.764	1868	10.771	1869	10.779
1870	10.786	1871	10.794	1872	10.801	1873	10.808	1874	10.816	1875	10.823	1876	10.831	1877	10.838	1878	10.845	1879	10.853
1880	10.860	1881	10.868	1882	10.875	1883	10.883	1884	10.890	1885	10.897	1886	10.905	1887	10.912	1888	10.920	1889	10.927
1890	10.934	1891	10.942	1892	10.949	1893	10.957	1894	10.964	1895	10.972	1896	10.979	1897	10.986	1898	10.994	1899	11.001
1900	11.009	1901	11.016	1902	11.024	1903	11.031	1904	11.039	1905	11.046	1906	11.053	1907	11.061	1908	11.068	1909	11.076
1910	11.083	1911	11.091	1912	11.098	1913	11.106	1914	11.113	1915	11.121	1916	11.128	1917	11.135	1918	11.143	1919	11.150
1920	11.158	1921	11.165	1922	11.173	1923	11.180	1924	11.188	1925	11.195	1926	11.203	1927	11.210	1928	11.218	1929	11.225
1930	11.233	1931	11.240	1932	11.247	1933	11.255	1934	11.262	1935	11.270	1936	11.277	1937	11.285	1938	11.292	1939	11.300
1940	11.307	1941	11.315	1942	11.322	1943	11.330	1944	11.337	1945	11.345	1946	11.352	1947	11.360	1948	11.367	1949	11.375
1950	11.382	1951	11.390	1952	11.397	1953	11.405	1954	11.412	1955	11.420	1956	11.427	1957	11.435	1958	11.442	1959	11.450
1960	11.457	1961	11.465	1962	11.472	1963	11.480	1964	11.487	1965	11.495	1966	11.502	1967	11.510	1968	11.518	1969	11.525
1970	11.533	1971	11.540	1972	11.548	1973	11.555	1974	11.563	1975	11.570	1976	11.578	1977	11.585	1978	11.593	1979	11.600
1980	11.608	1981	11.615	1982	11.623	1983	11.631	1984	11.638	1985	11.646	1986	11.653	1987	11.661	1988	11.668	1989	11.676
1990	11.683	1991	11.691	1992	11.698	1993	11.706	1994	11.714	1995	11.721	1996	11.729	1997	11.736	1998	11.744	1999	11.751
2000	11.759	2001	11.766	2002	11.774	2003	11.782	2004	11.789	2005	11.797	2006	11.804	2007	11.812	2008	11.819	2009	11.827
2010	11.834	2011	11.842	2012	11.850	2013	11.857	2014	11.865	2015	11.872	2016	11.880	2017	11.888	2018	11.895	2019	11.903
2020	11.910	2021	11.918	2022	11.925	2023	11.933	2024	11.941	2025	11.948	2026	11.956	2027	11.963	2028	11.971	2029	11.979
2030	11.986	2031	11.994	2032	12.001	2033	12.009	2034	12.016	2035	12.024	2036	12.032	2037	12.039	2038	12.047	2039	12.054
2040	12.062	2041	12.070	2042	12.077	2043	12.085	2044	12.092	2045	12.100	2046	12.108	2047	12.115	2048	12.123	2049	12.131
2050	12.138	2051	12.146	2052	12.153	2053	12.161	2054	12.169	2055	12.176	2056	12.184	2057	12.191	2058	12.199	2059	12.207
2060	12.214	2061	12.222	2062	12.230	2063	12.237	2064	12.245	2065	12.252	2066	12.260	2067	12.268	2068	12.275	2069	12.283
2070	12.291	2071	12.298	2072	12.306	2073	12.313	2074	12.321	2075	12.329	2076	12.336	2077	12.344	2078	12.352	2079	12.359
2080	12.367	2081	12.375	2082	12.382	2083	12.390	2084	12.397	2085	12.405	2086	12.413	2087	12.420	2088	12.428	2089	12.436
2090	12.443	2091	12.451	2092	12.459	2093	12.466	2094	12.474	2095	12.482	2096	12.489	2097	12.497	2098	12.505	2099	12.512
2100	12.520	2101	12.528	2102	12.535	2103	12.543	2104	12.551	2105	12.558	2106	12.566	2107	12.574	2108	12.581	2109	12.589
2110	12.597	2111	12.604	2112	12.612	2113	12.620	2114	12.627	2115	12.635	2116	12.643	2117	12.650	2118	12.658	2119	12.666
2120	12.673	2121	12.681	2122	12.689	2123	12.696	2124	12.704	2125	12.712	2126	12.719	2127	12.727	2128	12.735	2129	12.742
2130	12.750	2131	12.758	2132	12.765	2133	12.773	2134	12.781	2135	12.788	2136	12.796	2137	12.804	2138	12.812	2139	12.819
2140	12.827	2141	12.835	2142	12.842	2143	12.850	2144	12.858	2145	12.865	2146	12.873	2147	12.881	2148	12.889	2149	12.896
2150	12.904	2151	12.912	2152	12.919	2153	12.927	2154	12.935	2155	12.942	2156	12.950	2157	12.958	2158	12.966	2159	12.973
2160	12.981	2161	12.989	2162	12.996	2163	13.004	2164	13.012	2165	13.019	2166	13.027	2167	13.035	2168	13.043	2169	13.050
2170	13.058	2171	13.066	2172	13.073	2173	13.081	2174	13.089	2175	13.097	2176	13.104	2177	13.112	2178	13.120	2179	13.128
2180	13.135	2181	13.143	2182	13.151	2183	13.158	2184	13.166	2185	13.174	2186	13.182	2187	13.189	2188	13.197	2189	13.205
2190	13.213	2191	13.220	2192	13.228	2193	13.236	2194	13.243	2195	13.251	2196	13.259	2197	13.267	2198	13.274	2199	13.282
2200	13.290	2201	13.298	2202	13.305	2203	13.313	2204	13.321	2205	13.329	2206	13.336	2207	13.344	2208	13.352	2209	13.359
2210	13.367	2211	13.375	2212	13.383	2213	13.390	2214	13.398	2215	13.406	2216	13.414	2217	13.421	2218	13.429	2219	13.437
2220	13.445	2221	13.452	2222	13.460	2223	13.468	2224	13.476	2225	13.483	2226	13.491	2227	13.499	2228	13.507	2229	13.514
2230	13.522	2231	13.530	2232	13.538	2233	13.545	2234	13.553	2235	13.561	2236	13.569	2237	13.577	2238	13.584	2239	13.592
2240	13.600	2241	13.608	2242	13.615	2243	13.623	2244	13.631	2245	13.639	2246	13.646	2247	13.654	2248	13.662	2249	13.670

Type R Thermocouple

°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
2250	13.677	2251	13.685	2252	13.693	2253	13.701	2254	13.709	2255	13.716	2256	13.724	2257	13.732	2258	13.740	2259	13.747
2260	13.755	2261	13.763	2262	13.771	2263	13.778	2264	13.786	2265	13.794	2266	13.802	2267	13.810	2268	13.817	2269	13.825
2270	13.833	2271	13.841	2272	13.848	2273	13.856	2274	13.864	2275	13.872	2276	13.880	2277	13.887	2278	13.895	2279	13.903
2280	13.911	2281	13.919	2282	13.926	2283	13.934	2284	13.942	2285	13.950	2286	13.957	2287	13.965	2288	13.973	2289	13.981
2290	13.989	2291	13.996	2292	14.004	2293	14.012	2294	14.020	2295	14.028	2296	14.035	2297	14.043	2298	14.051	2299	14.059
2300	14.066	2301	14.074	2302	14.082	2303	14.090	2304	14.098	2305	14.105	2306	14.113	2307	14.121	2308	14.129	2309	14.137
2310	14.144	2311	14.152	2312	14.160	2313	14.168	2314	14.176	2315	14.183	2316	14.191	2317	14.199	2318	14.207	2319	14.215
2320	14.222	2321	14.230	2322	14.238	2323	14.246	2324	14.254	2325	14.261	2326	14.269	2327	14.277	2328	14.285	2329	14.293
2330	14.300	2331	14.308	2332	14.316	2333	14.324	2334	14.332	2335	14.340	2336	14.347	2337	14.355	2338	14.363	2339	14.371
2340	14.379	2341	14.386	2342	14.394	2343	14.402	2344	14.410	2345	14.418	2346	14.425	2347	14.433	2348	14.441	2349	14.449
2350	14.457	2351	14.465	2352	14.472	2353	14.480	2354	14.488	2355	14.496	2356	14.504	2357	14.511	2358	14.519	2359	14.527
2360	14.535	2361	14.543	2362	14.551	2363	14.558	2364	14.566	2365	14.574	2366	14.582	2367	14.590	2368	14.597	2369	14.605
2370	14.613	2371	14.621	2372	14.629	2373	14.637	2374	14.644	2375	14.652	2376	14.660	2377	14.668	2378	14.676	2379	14.683
2380	14.691	2381	14.699	2382	14.707	2383	14.715	2384	14.723	2385	14.730	2386	14.738	2387	14.746	2388	14.754	2389	14.762
2390	14.770	2391	14.777	2392	14.785	2393	14.793	2394	14.801	2395	14.809	2396	14.817	2397	14.824	2398	14.832	2399	14.840
2400	14.848	2401	14.856	2402	14.864	2403	14.871	2404	14.879	2405	14.887	2406	14.895	2407	14.903	2408	14.911	2409	14.918
2410	14.926	2411	14.934	2412	14.942	2413	14.950	2414	14.958	2415	14.965	2416	14.973	2417	14.981	2418	14.989	2419	14.997
2420	15.005	2421	15.012	2422	15.020	2423	15.028	2424	15.036	2425	15.044	2426	15.052	2427	15.059	2428	15.067	2429	15.075
2430	15.083	2431	15.091	2432	15.099	2433	15.106	2434	15.114	2435	15.122	2436	15.130	2437	15.138	2438	15.146	2439	15.153
2440	15.161	2441	15.169	2442	15.177	2443	15.185	2444	15.193	2445	15.200	2446	15.208	2447	15.216	2448	15.224	2449	15.232
2450	15.240	2451	15.248	2452	15.255	2453	15.263	2454	15.271	2455	15.279	2456	15.287	2457	15.295	2458	15.302	2459	15.310
2460	15.318	2461	15.326	2462	15.334	2463	15.342	2464	15.349	2465	15.357	2466	15.365	2467	15.373	2468	15.381	2469	15.389
2470	15.397	2471	15.404	2472	15.412	2473	15.420	2474	15.428	2475	15.436	2476	15.444	2477	15.451	2478	15.459	2479	15.467
2480	15.475	2481	15.483	2482	15.491	2483	15.499	2484	15.506	2485	15.514	2486	15.522	2487	15.530	2488	15.538	2489	15.546
2490	15.553	2491	15.561	2492	15.569	2493	15.577	2494	15.585	2495	15.593	2496	15.601	2497	15.608	2498	15.616	2499	15.624
2500	15.632	2501	15.640	2502	15.648	2503	15.655	2504	15.663	2505	15.671	2506	15.679	2507	15.687	2508	15.695	2509	15.703
2510	15.710	2511	15.718	2512	15.726	2513	15.734	2514	15.742	2515	15.750	2516	15.758	2517	15.765	2518	15.773	2519	15.781
2520	15.789	2521	15.797	2522	15.805	2523	15.812	2524	15.820	2525	15.828	2526	15.836	2527	15.844	2528	15.852	2529	15.860
2530	15.867	2531	15.875	2532	15.883	2533	15.891	2534	15.899	2535	15.907	2536	15.915	2537	15.922	2538	15.930	2539	15.938
2540	15.946	2541	15.954	2542	15.962	2543	15.969	2544	15.977	2545	15.985	2546	15.993	2547	16.001	2548	16.009	2549	16.017
2550	16.024	2551	16.032	2552	16.040	2553	16.048	2554	16.056	2555	16.064	2556	16.071	2557	16.079	2558	16.087	2559	16.095
2560	16.103	2561	16.111	2562	16.119	2563	16.126	2564	16.134	2565	16.142	2566	16.150	2567	16.158	2568	16.166	2569	16.174
2570	16.181	2571	16.189	2572	16.197	2573	16.205	2574	16.213	2575	16.221	2576	16.228	2577	16.236	2578	16.244	2579	16.252
2580	16.260	2581	16.268	2582	16.276	2583	16.283	2584	16.291	2585	16.299	2586	16.307	2587	16.315	2588	16.323	2589	16.330
2590	16.338	2591	16.346	2592	16.354	2593	16.362	2594	16.370	2595	16.378	2596	16.385	2597	16.393	2598	16.401	2599	16.409
2600	16.417	2601	16.425	2602	16.432	2603	16.440	2604	16.448	2605	16.456	2606	16.464	2607	16.472	2608	16.480	2609	16.487
2610	16.495	2611	16.503	2612	16.511	2613	16.519	2614	16.527	2615	16.534	2616	16.542	2617	16.550	2618	16.558	2619	16.566
2620	16.574	2621	16.582	2622	16.589	2623	16.597	2624	16.605	2625	16.613	2626	16.621	2627	16.629	2628	16.636	2629	16.644
2630	16.652	2631	16.660	2632	16.668	2633	16.676	2634	16.683	2635	16.691	2636	16.699	2637	16.707	2638	16.715	2639	16.723

Type R Thermocouple

°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
2640	16.731	2641	16.738	2642	16.746	2643	16.754	2644	16.762	2645	16.770	2646	16.778	2647	16.785	2648	16.793	2649	16.801
2650	16.809	2651	16.817	2652	16.825	2653	16.832	2654	16.840	2655	16.848	2656	16.856	2657	16.864	2658	16.872	2659	16.879
2660	16.887	2661	16.895	2662	16.903	2663	16.911	2664	16.919	2665	16.926	2666	16.934	2667	16.942	2668	16.950	2669	16.958
2670	16.966	2671	16.973	2672	16.981	2673	16.989	2674	16.997	2675	17.005	2676	17.013	2677	17.020	2678	17.028	2679	17.036
2680	17.044	2681	17.052	2682	17.060	2683	17.067	2684	17.075	2685	17.083	2686	17.091	2687	17.099	2688	17.107	2689	17.114
2690	17.122	2691	17.130	2692	17.138	2693	17.146	2694	17.154	2695	17.161	2696	17.169	2697	17.177	2698	17.185	2699	17.193
2700	17.200	2701	17.208	2702	17.216	2703	17.224	2704	17.232	2705	17.240	2706	17.247	2707	17.255	2708	17.263	2709	17.271
2710	17.279	2711	17.286	2712	17.294	2713	17.302	2714	17.310	2715	17.318	2716	17.326	2717	17.333	2718	17.341	2719	17.349
2720	17.357	2721	17.365	2722	17.373	2723	17.380	2724	17.388	2725	17.396	2726	17.404	2727	17.412	2728	17.419	2729	17.427
2730	17.435	2731	17.443	2732	17.451	2733	17.458	2734	17.466	2735	17.474	2736	17.482	2737	17.490	2738	17.498	2739	17.505
2740	17.513	2741	17.521	2742	17.529	2743	17.537	2744	17.544	2745	17.552	2746	17.560	2747	17.568	2748	17.576	2749	17.583
2750	17.591	2751	17.599	2752	17.607	2753	17.615	2754	17.622	2755	17.630	2756	17.638	2757	17.646	2758	17.654	2759	17.661
2760	17.669	2761	17.677	2762	17.685	2763	17.693	2764	17.700	2765	17.708	2766	17.716	2767	17.724	2768	17.732	2769	17.739
2770	17.747	2771	17.755	2772	17.763	2773	17.771	2774	17.778	2775	17.786	2776	17.794	2777	17.802	2778	17.810	2779	17.817
2780	17.825	2781	17.833	2782	17.841	2783	17.849	2784	17.856	2785	17.864	2786	17.872	2787	17.880	2788	17.888	2789	17.895
2790	17.903	2791	17.911	2792	17.919	2793	17.926	2794	17.934	2795	17.942	2796	17.950	2797	17.958	2798	17.965	2799	17.973
2800	17.981	2801	17.989	2802	17.997	2803	18.004	2804	18.012	2805	18.020	2806	18.028	2807	18.035	2808	18.043	2809	18.051
2810	18.059	2811	18.067	2812	18.074	2813	18.082	2814	18.090	2815	18.098	2816	18.105	2817	18.113	2818	18.121	2819	18.129
2820	18.137	2821	18.144	2822	18.152	2823	18.160	2824	18.168	2825	18.175	2826	18.183	2827	18.191	2828	18.199	2829	18.206
2830	18.214	2831	18.222	2832	18.230	2833	18.238	2834	18.245	2835	18.253	2836	18.261	2837	18.269	2838	18.276	2839	18.284
2840	18.292	2841	18.300	2842	18.307	2843	18.315	2844	18.323	2845	18.331	2846	18.338	2847	18.346	2848	18.354	2849	18.362
2850	18.369	2851	18.377	2852	18.385	2853	18.393	2854	18.400	2855	18.408	2856	18.416	2857	18.424	2858	18.431	2859	18.439
2860	18.447	2861	18.455	2862	18.462	2863	18.470	2864	18.478	2865	18.486	2866	18.493	2867	18.501	2868	18.509	2869	18.517
2870	18.524	2871	18.532	2872	18.540	2873	18.548	2874	18.555	2875	18.563	2876	18.571	2877	18.579	2878	18.586	2879	18.594
2880	18.602	2881	18.610	2882	18.617	2883	18.625	2884	18.633	2885	18.640	2886	18.648	2887	18.656	2888	18.664	2889	18.671
2890	18.679	2891	18.687	2892	18.695	2893	18.702	2894	18.710	2895	18.718	2896	18.725	2897	18.733	2898	18.741	2899	18.749
2900	18.756	2901	18.764	2902	18.772	2903	18.779	2904	18.787	2905	18.795	2906	18.803	2907	18.810	2908	18.818	2909	18.826
2910	18.834	2911	18.841	2912	18.849	2913	18.857	2914	18.864	2915	18.872	2916	18.880	2917	18.887	2918	18.895	2919	18.903
2920	18.911	2921	18.918	2922	18.926	2923	18.934	2924	18.941	2925	18.949	2926	18.957	2927	18.965	2928	18.972	2929	18.980
2930	18.988	2931	18.995	2932	19.003	2933	19.011	2934	19.018	2935	19.026	2936	19.034	2937	19.042	2938	19.049	2939	19.057
2940	19.065	2941	19.072	2942	19.080	2943	19.088	2944	19.095	2945	19.103	2946	19.111	2947	19.118	2948	19.126	2949	19.134
2950	19.141	2951	19.149	2952	19.157	2953	19.165	2954	19.172	2955	19.180	2956	19.188	2957	19.195	2958	19.203	2959	19.211
2960	19.218	2961	19.226	2962	19.234	2963	19.241	2964	19.249	2965	19.257	2966	19.264	2967	19.272	2968	19.280	2969	19.287
2970	19.295	2971	19.303	2972	19.310	2973	19.318	2974	19.326	2975	19.333	2976	19.341	2977	19.349	2978	19.356	2979	19.364
2980	19.372	2981	19.379	2982	19.387	2983	19.395	2984	19.402	2985	19.410	2986	19.418	2987	19.425	2988	19.433	2989	19.440
2990	19.448	2991	19.456	2992	19.463	2993	19.471	2994	19.479	2995	19.486	2996	19.494	2997	19.502	2998	19.509	2999	19.517
3000	19.525	3001	19.532	3002	19.540	3003	19.547	3004	19.555	3005	19.563	3006	19.570	3007	19.578	3008	19.586	3009	19.593
3010	19.601	3011	19.609	3012	19.616	3013	19.624	3014	19.631	3015	19.639	3016	19.647	3017	19.654	3018	19.662	3019	19.670
3020	19.677	3021	19.685	3022	19.692	3023	19.700	3024	19.708	3025	19.715	3026	19.723	3027	19.730	3028	19.738	3029	19.746

Type R Thermocouple

°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
3030	19.753	3031	19.761	3032	19.769	3033	19.776	3034	19.784	3035	19.791	3036	19.799	3037	19.807	3038	19.814	3039	19.822
3040	19.829	3041	19.837	3042	19.845	3043	19.852	3044	19.860	3045	19.867	3046	19.875	3047	19.882	3048	19.890	3049	19.898
3050	19.905	3051	19.913	3052	19.920	3053	19.928	3054	19.936	3055	19.943	3056	19.951	3057	19.958	3058	19.966	3059	19.973
3060	19.981	3061	19.989	3062	19.996	3063	20.004	3064	20.011	3065	20.019	3066	20.026	3067	20.034	3068	20.041	3069	20.049
3070	20.056	3071	20.064	3072	20.072	3073	20.079	3074	20.087	3075	20.094	3076	20.102	3077	20.109	3078	20.117	3079	20.124
3080	20.132	3081	20.139	3082	20.147	3083	20.154	3084	20.162	3085	20.169	3086	20.177	3087	20.184	3088	20.192	3089	20.199
3090	20.207	3091	20.214	3092	20.222	3093	20.229	3094	20.237	3095	20.244	3096	20.252	3097	20.259	3098	20.266	3099	20.274
3100	20.281	3101	20.289	3102	20.296	3103	20.304	3104	20.311	3105	20.319	3106	20.326	3107	20.333	3108	20.341	3109	20.348
3110	20.356	3111	20.363	3112	20.371	3113	20.378	3114	20.385	3115	20.393	3116	20.400	3117	20.407	3118	20.415	3119	20.422
3120	20.430	3121	20.437	3122	20.444	3123	20.452	3124	20.459	3125	20.466	3126	20.474	3127	20.481	3128	20.488	3129	20.496
3130	20.503	3131	20.510	3132	20.518	3133	20.525	3134	20.532	3135	20.540	3136	20.547	3137	20.554	3138	20.562	3139	20.569
3140	20.576	3141	20.583	3142	20.591	3143	20.598	3144	20.605	3145	20.612	3146	20.620	3147	20.627	3148	20.634	3149	20.641
3150	20.649	3151	20.656	3152	20.663	3153	20.670	3154	20.678	3155	20.685	3156	20.692	3157	20.699	3158	20.706	3159	20.714
3160	20.721	3161	20.728	3162	20.735	3163	20.742	3164	20.749	3165	20.756	3166	20.764	3167	20.771	3168	20.778	3169	20.785
3170	20.792	3171	20.799	3172	20.806	3173	20.813	3174	20.821	3175	20.828	3176	20.835	3177	20.842	3178	20.849	3179	20.856
3180	20.863	3181	20.870	3182	20.877	3183	20.884	3184	20.891	3185	20.898	3186	20.905	3187	20.912	3188	20.919	3189	20.926
3190	20.933	3191	20.940	3192	20.947	3193	20.954	3194	20.961	3195	20.968	3196	20.975	3197	20.982	3198	20.989	3199	20.996
3200	21.003	3201	21.010	3202	21.016	3203	21.023	3204	21.030	3205	21.037	3206	21.044	3207	21.051	3208	21.058	3209	21.065
3210	21.071																		

6.3 Tables for Type S Thermocouple

Table 8 *Type S Thermocouple –50°C to 1720°C vs milliVolts*

Type S Thermocouple																				
°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV
–50	–0.236	–49	–0.232	–48	–0.228	–47	–0.224	–46	–0.219	–45	–0.215	–44	–0.211	–43	–0.207	–42	–0.203	–41	–0.199
–40	–0.194	–39	–0.190	–38	–0.186	–37	–0.181	–36	–0.177	–35	–0.173	–34	–0.168	–33	–0.164	–32	–0.159	–31	–0.155
–30	–0.150	–29	–0.146	–28	–0.141	–27	–0.136	–26	–0.132	–25	–0.127	–24	–0.122	–23	–0.117	–22	–0.113	–21	–0.108
–20	–0.103	–19	–0.098	–18	–0.093	–17	–0.088	–16	–0.083	–15	–0.078	–14	–0.073	–13	–0.068	–12	–0.063	–11	–0.058
–10	–0.053	–9	–0.048	–8	–0.042	–7	–0.037	–6	–0.032	–5	–0.027	–4	–0.021	–3	–0.016	–2	–0.011	–1	–0.005
0	0.000	1	0.005	2	0.011	3	0.016	4	0.022	5	0.027	6	0.033	7	0.038	8	0.044	9	0.050
10	0.055	11	0.061	12	0.067	13	0.072	14	0.078	15	0.084	16	0.090	17	0.095	18	0.101	19	0.107
20	0.113	21	0.119	22	0.125	23	0.131	24	0.137	25	0.143	26	0.149	27	0.155	28	0.161	29	0.167
30	0.173	31	0.179	32	0.185	33	0.191	34	0.197	35	0.204	36	0.210	37	0.216	38	0.222	39	0.229
40	0.235	41	0.241	42	0.248	43	0.254	44	0.260	45	0.267	46	0.273	47	0.280	48	0.286	49	0.292
50	0.299	51	0.305	52	0.312	53	0.319	54	0.325	55	0.332	56	0.338	57	0.345	58	0.352	59	0.358
60	0.365	61	0.372	62	0.378	63	0.385	64	0.392	65	0.399	66	0.405	67	0.412	68	0.419	69	0.426
70	0.433	71	0.440	72	0.446	73	0.453	74	0.460	75	0.467	76	0.474	77	0.481	78	0.488	79	0.495
80	0.502	81	0.509	82	0.516	83	0.523	84	0.530	85	0.538	86	0.545	87	0.552	88	0.559	89	0.566
90	0.573	91	0.580	92	0.588	93	0.595	94	0.602	95	0.609	96	0.617	97	0.624	98	0.631	99	0.639
100	0.646	101	0.653	102	0.661	103	0.668	104	0.675	105	0.683	106	0.690	107	0.698	108	0.705	109	0.713
110	0.720	111	0.727	112	0.735	113	0.743	114	0.750	115	0.758	116	0.765	117	0.773	118	0.780	119	0.788
120	0.795	121	0.803	122	0.811	123	0.818	124	0.826	125	0.834	126	0.841	127	0.849	128	0.857	129	0.865
130	0.872	131	0.880	132	0.888	133	0.896	134	0.903	135	0.911	136	0.919	137	0.927	138	0.935	139	0.942
140	0.950	141	0.958	142	0.966	143	0.974	144	0.982	145	0.990	146	0.998	147	1.006	148	1.013	149	1.021
150	1.029	151	1.037	152	1.045	153	1.053	154	1.061	155	1.069	156	1.077	157	1.085	158	1.094	159	1.102
160	1.110	161	1.118	162	1.126	163	1.134	164	1.142	165	1.150	166	1.158	167	1.167	168	1.175	169	1.183
170	1.191	171	1.199	172	1.207	173	1.216	174	1.224	175	1.232	176	1.240	177	1.249	178	1.257	179	1.265
180	1.273	181	1.282	182	1.290	183	1.298	184	1.307	185	1.315	186	1.323	187	1.332	188	1.340	189	1.348
190	1.357	191	1.365	192	1.373	193	1.382	194	1.390	195	1.399	196	1.407	197	1.415	198	1.424	199	1.432
200	1.441	201	1.449	202	1.458	203	1.466	204	1.475	205	1.483	206	1.492	207	1.500	208	1.509	209	1.517
210	1.526	211	1.534	212	1.543	213	1.551	214	1.560	215	1.569	216	1.577	217	1.586	218	1.594	219	1.603
220	1.612	221	1.620	222	1.629	223	1.638	224	1.646	225	1.655	226	1.663	227	1.672	228	1.681	229	1.690
230	1.698	231	1.707	232	1.716	233	1.724	234	1.733	235	1.742	236	1.751	237	1.759	238	1.768	239	1.777
240	1.786	241	1.794	242	1.803	243	1.812	244	1.821	245	1.829	246	1.838	247	1.847	248	1.856	249	1.865
250	1.874	251	1.882	252	1.891	253	1.900	254	1.909	255	1.918	256	1.927	257	1.936	258	1.944	259	1.953
260	1.962	261	1.971	262	1.980	263	1.989	264	1.998	265	2.007	266	2.016	267	2.025	268	2.034	269	2.043
270	2.052	271	2.061	272	2.070	273	2.078	274	2.087	275	2.096	276	2.105	277	2.114	278	2.123	279	2.132

Type S Thermocouple

°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV
280	2.141	281	2.151	282	2.160	283	2.169	284	2.178	285	2.187	286	2.196	287	2.205	288	2.214	289	2.223
290	2.232	291	2.241	292	2.250	293	2.259	294	2.268	295	2.277	296	2.287	297	2.296	298	2.305	299	2.314
300	2.323	301	2.332	302	2.341	303	2.350	304	2.360	305	2.369	306	2.378	307	2.387	308	2.396	309	2.405
310	2.415	311	2.424	312	2.433	313	2.442	314	2.451	315	2.461	316	2.470	317	2.479	318	2.488	319	2.497
320	2.507	321	2.516	322	2.525	323	2.534	324	2.544	325	2.553	326	2.562	327	2.571	328	2.581	329	2.590
330	2.599	331	2.609	332	2.618	333	2.627	334	2.636	335	2.646	336	2.655	337	2.664	338	2.674	339	2.683
340	2.692	341	2.702	342	2.711	343	2.720	344	2.730	345	2.739	346	2.748	347	2.758	348	2.767	349	2.776
350	2.786	351	2.795	352	2.805	353	2.814	354	2.823	355	2.833	356	2.842	357	2.851	358	2.861	359	2.870
360	2.880	361	2.889	362	2.899	363	2.908	364	2.917	365	2.927	366	2.936	367	2.946	368	2.955	369	2.965
370	2.974	371	2.983	372	2.993	373	3.002	374	3.012	375	3.021	376	3.031	377	3.040	378	3.050	379	3.059
380	3.069	381	3.078	382	3.088	383	3.097	384	3.107	385	3.116	386	3.126	387	3.135	388	3.145	389	3.154
390	3.164	391	3.173	392	3.183	393	3.192	394	3.202	395	3.212	396	3.221	397	3.231	398	3.240	399	3.250
400	3.259	401	3.269	402	3.279	403	3.288	404	3.298	405	3.307	406	3.317	407	3.326	408	3.336	409	3.346
410	3.355	411	3.365	412	3.374	413	3.384	414	3.394	415	3.403	416	3.413	417	3.423	418	3.432	419	3.442
420	3.451	421	3.461	422	3.471	423	3.480	424	3.490	425	3.500	426	3.509	427	3.519	428	3.529	429	3.538
430	3.548	431	3.558	432	3.567	433	3.577	434	3.587	435	3.596	436	3.606	437	3.616	438	3.626	439	3.635
440	3.645	441	3.655	442	3.664	443	3.674	444	3.684	445	3.694	446	3.703	447	3.713	448	3.723	449	3.732
450	3.742	451	3.752	452	3.762	453	3.771	454	3.781	455	3.791	456	3.801	457	3.810	458	3.820	459	3.830
460	3.840	461	3.850	462	3.859	463	3.869	464	3.879	465	3.889	466	3.898	467	3.908	468	3.918	469	3.928
470	3.938	471	3.947	472	3.957	473	3.967	474	3.977	475	3.987	476	3.997	477	4.006	478	4.016	479	4.026
480	4.036	481	4.046	482	4.056	483	4.065	484	4.075	485	4.085	486	4.095	487	4.105	488	4.115	489	4.125
490	4.134	491	4.144	492	4.154	493	4.164	494	4.174	495	4.184	496	4.194	497	4.204	498	4.213	499	4.223
500	4.233	501	4.243	502	4.253	503	4.263	504	4.273	505	4.283	506	4.293	507	4.303	508	4.313	509	4.323
510	4.332	511	4.342	512	4.352	513	4.362	514	4.372	515	4.382	516	4.392	517	4.402	518	4.412	519	4.422
520	4.432	521	4.442	522	4.452	523	4.462	524	4.472	525	4.482	526	4.492	527	4.502	528	4.512	529	4.522
530	4.532	531	4.542	532	4.552	533	4.562	534	4.572	535	4.582	536	4.592	537	4.602	538	4.612	539	4.622
540	4.632	541	4.642	542	4.652	543	4.662	544	4.672	545	4.682	546	4.692	547	4.702	548	4.712	549	4.722
550	4.732	551	4.742	552	4.752	553	4.762	554	4.772	555	4.782	556	4.793	557	4.803	558	4.813	559	4.823
560	4.833	561	4.843	562	4.853	563	4.863	564	4.873	565	4.883	566	4.893	567	4.904	568	4.914	569	4.924
570	4.934	571	4.944	572	4.954	573	4.964	574	4.974	575	4.984	576	4.995	577	5.005	578	5.015	579	5.025
580	5.035	581	5.045	582	5.055	583	5.066	584	5.076	585	5.086	586	5.096	587	5.106	588	5.116	589	5.127
590	5.137	591	5.147	592	5.157	593	5.167	594	5.178	595	5.188	596	5.198	597	5.208	598	5.218	599	5.228
600	5.239	601	5.249	602	5.259	603	5.269	604	5.280	605	5.290	606	5.300	607	5.310	608	5.320	609	5.331
610	5.341	611	5.351	612	5.361	613	5.372	614	5.382	615	5.392	616	5.402	617	5.413	618	5.423	619	5.433
620	5.443	621	5.454	622	5.464	623	5.474	624	5.485	625	5.495	626	5.505	627	5.515	628	5.526	629	5.536
630	5.546	631	5.557	632	5.567	633	5.577	634	5.588	635	5.598	636	5.608	637	5.618	638	5.629	639	5.639
640	5.649	641	5.660	642	5.670	643	5.680	644	5.691	645	5.701	646	5.712	647	5.722	648	5.732	649	5.743
650	5.753	651	5.763	652	5.774	653	5.784	654	5.794	655	5.805	656	5.815	657	5.826	658	5.836	659	5.846
660	5.857	661	5.867	662	5.878	663	5.888	664	5.898	665	5.909	666	5.919	667	5.930	668	5.940	669	5.950

Type S Thermocouple

°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV
670	5.961	671	5.971	672	5.982	673	5.992	674	6.003	675	6.013	676	6.024	677	6.034	678	6.044	679	6.055
680	6.065	681	6.076	682	6.086	683	6.097	684	6.107	685	6.118	686	6.128	687	6.139	688	6.149	689	6.160
690	6.170	691	6.181	692	6.191	693	6.202	694	6.212	695	6.223	696	6.233	697	6.244	698	6.254	699	6.265
700	6.275	701	6.286	702	6.296	703	6.307	704	6.317	705	6.328	706	6.338	707	6.349	708	6.360	709	6.370
710	6.381	711	6.391	712	6.402	713	6.412	714	6.423	715	6.434	716	6.444	717	6.455	718	6.465	719	6.476
720	6.486	721	6.497	722	6.508	723	6.518	724	6.529	725	6.539	726	6.550	727	6.561	728	6.571	729	6.582
730	6.593	731	6.603	732	6.614	733	6.624	734	6.635	735	6.646	736	6.656	737	6.667	738	6.678	739	6.688
740	6.699	741	6.710	742	6.720	743	6.731	744	6.742	745	6.752	746	6.763	747	6.774	748	6.784	749	6.795
750	6.806	751	6.817	752	6.827	753	6.838	754	6.849	755	6.859	756	6.870	757	6.881	758	6.892	759	6.902
760	6.913	761	6.924	762	6.934	763	6.945	764	6.956	765	6.967	766	6.977	767	6.988	768	6.999	769	7.010
770	7.020	771	7.031	772	7.042	773	7.053	774	7.064	775	7.074	776	7.085	777	7.096	778	7.107	779	7.117
780	7.128	781	7.139	782	7.150	783	7.161	784	7.172	785	7.182	786	7.193	787	7.204	788	7.215	789	7.226
790	7.236	791	7.247	792	7.258	793	7.269	794	7.280	795	7.291	796	7.302	797	7.312	798	7.323	799	7.334
800	7.345	801	7.356	802	7.367	803	7.378	804	7.388	805	7.399	806	7.410	807	7.421	808	7.432	809	7.443
810	7.454	811	7.465	812	7.476	813	7.487	814	7.497	815	7.508	816	7.519	817	7.530	818	7.541	819	7.552
820	7.563	821	7.574	822	7.585	823	7.596	824	7.607	825	7.618	826	7.629	827	7.640	828	7.651	829	7.662
830	7.673	831	7.684	832	7.695	833	7.706	834	7.717	835	7.728	836	7.739	837	7.750	838	7.761	839	7.772
840	7.783	841	7.794	842	7.805	843	7.816	844	7.827	845	7.838	846	7.849	847	7.860	848	7.871	849	7.882
850	7.893	851	7.904	852	7.915	853	7.926	854	7.937	855	7.948	856	7.959	857	7.970	858	7.981	859	7.992
860	8.003	861	8.014	862	8.026	863	8.037	864	8.048	865	8.059	866	8.070	867	8.081	868	8.092	869	8.103
870	8.114	871	8.125	872	8.137	873	8.148	874	8.159	875	8.170	876	8.181	877	8.192	878	8.203	879	8.214
880	8.226	881	8.237	882	8.248	883	8.259	884	8.270	885	8.281	886	8.293	887	8.304	888	8.315	889	8.326
890	8.337	891	8.348	892	8.360	893	8.371	894	8.382	895	8.393	896	8.404	897	8.416	898	8.427	899	8.438
900	8.449	901	8.460	902	8.472	903	8.483	904	8.494	905	8.505	906	8.517	907	8.528	908	8.539	909	8.550
910	8.562	911	8.573	912	8.584	913	8.595	914	8.607	915	8.618	916	8.629	917	8.640	918	8.652	919	8.663
920	8.674	921	8.685	922	8.697	923	8.708	924	8.719	925	8.731	926	8.742	927	8.753	928	8.765	929	8.776
930	8.787	931	8.798	932	8.810	933	8.821	934	8.832	935	8.844	936	8.855	937	8.866	938	8.878	939	8.889
940	8.900	941	8.912	942	8.923	943	8.935	944	8.946	945	8.957	946	8.969	947	8.980	948	8.991	949	9.003
950	9.014	951	9.025	952	9.037	953	9.048	954	9.060	955	9.071	956	9.082	957	9.094	958	9.105	959	9.117
960	9.128	961	9.139	962	9.151	963	9.162	964	9.174	965	9.185	966	9.197	967	9.208	968	9.219	969	9.231
970	9.242	971	9.254	972	9.265	973	9.277	974	9.288	975	9.300	976	9.311	977	9.323	978	9.334	979	9.345
980	9.357	981	9.368	982	9.380	983	9.391	984	9.403	985	9.414	986	9.426	987	9.437	988	9.449	989	9.460
990	9.472	991	9.483	992	9.495	993	9.506	994	9.518	995	9.529	996	9.541	997	9.552	998	9.564	999	9.576
1000	9.587	1001	9.599	1002	9.610	1003	9.622	1004	9.633	1005	9.645	1006	9.656	1007	9.668	1008	9.680	1009	9.691
1010	9.703	1011	9.714	1012	9.726	1013	9.737	1014	9.749	1015	9.761	1016	9.772	1017	9.784	1018	9.795	1019	9.807
1020	9.819	1021	9.830	1022	9.842	1023	9.853	1024	9.865	1025	9.877	1026	9.888	1027	9.900	1028	9.911	1029	9.923
1030	9.935	1031	9.946	1032	9.958	1033	9.970	1034	9.981	1035	9.993	1036	10.005	1037	10.016	1038	10.028	1039	10.040
1040	10.051	1041	10.063	1042	10.075	1043	10.086	1044	10.098	1045	10.110	1046	10.121	1047	10.133	1048	10.145	1049	10.156
1050	10.168	1051	10.180	1052	10.191	1053	10.203	1054	10.215	1055	10.227	1056	10.238	1057	10.250	1058	10.262	1059	10.273

Type S Thermocouple

°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV
1060	10.285	1061	10.297	1062	10.309	1063	10.320	1064	10.332	1065	10.344	1066	10.356	1067	10.367	1068	10.379	1069	10.391
1070	10.403	1071	10.414	1072	10.426	1073	10.438	1074	10.450	1075	10.461	1076	10.473	1077	10.485	1078	10.497	1079	10.509
1080	10.520	1081	10.532	1082	10.544	1083	10.556	1084	10.567	1085	10.579	1086	10.591	1087	10.603	1088	10.615	1089	10.626
1090	10.638	1091	10.650	1092	10.662	1093	10.674	1094	10.686	1095	10.697	1096	10.709	1097	10.721	1098	10.733	1099	10.745
1100	10.757	1101	10.768	1102	10.780	1103	10.792	1104	10.804	1105	10.816	1106	10.828	1107	10.839	1108	10.851	1109	10.863
1110	10.875	1111	10.887	1112	10.899	1113	10.911	1114	10.922	1115	10.934	1116	10.946	1117	10.958	1118	10.970	1119	10.982
1120	10.994	1121	11.006	1122	11.017	1123	11.029	1124	11.041	1125	11.053	1126	11.065	1127	11.077	1128	11.089	1129	11.101
1130	11.113	1131	11.125	1132	11.136	1133	11.148	1134	11.160	1135	11.172	1136	11.184	1137	11.196	1138	11.208	1139	11.220
1140	11.232	1141	11.244	1142	11.256	1143	11.268	1144	11.280	1145	11.291	1146	11.303	1147	11.315	1148	11.327	1149	11.339
1150	11.351	1151	11.363	1152	11.375	1153	11.387	1154	11.399	1155	11.411	1156	11.423	1157	11.435	1158	11.447	1159	11.459
1160	11.471	1161	11.483	1162	11.495	1163	11.507	1164	11.519	1165	11.531	1166	11.542	1167	11.554	1168	11.566	1169	11.578
1170	11.590	1171	11.602	1172	11.614	1173	11.626	1174	11.638	1175	11.650	1176	11.662	1177	11.674	1178	11.686	1179	11.698
1180	11.710	1181	11.722	1182	11.734	1183	11.746	1184	11.758	1185	11.770	1186	11.782	1187	11.794	1188	11.806	1189	11.818
1190	11.830	1191	11.842	1192	11.854	1193	11.866	1194	11.878	1195	11.890	1196	11.902	1197	11.914	1198	11.926	1199	11.939
1200	11.951	1201	11.963	1202	11.975	1203	11.987	1204	11.999	1205	12.011	1206	12.023	1207	12.035	1208	12.047	1209	12.059
1210	12.071	1211	12.083	1212	12.095	1213	12.107	1214	12.119	1215	12.131	1216	12.143	1217	12.155	1218	12.167	1219	12.179
1220	12.191	1221	12.203	1222	12.216	1223	12.228	1224	12.240	1225	12.252	1226	12.264	1227	12.276	1228	12.288	1229	12.300
1230	12.312	1231	12.324	1232	12.336	1233	12.348	1234	12.360	1235	12.372	1236	12.384	1237	12.397	1238	12.409	1239	12.421
1240	12.433	1241	12.445	1242	12.457	1243	12.469	1244	12.481	1245	12.493	1246	12.505	1247	12.517	1248	12.529	1249	12.542
1250	12.554	1251	12.566	1252	12.578	1253	12.590	1254	12.602	1255	12.614	1256	12.626	1257	12.638	1258	12.650	1259	12.662
1260	12.675	1261	12.687	1262	12.699	1263	12.711	1264	12.723	1265	12.735	1266	12.747	1267	12.759	1268	12.771	1269	12.783
1270	12.796	1271	12.808	1272	12.820	1273	12.832	1274	12.844	1275	12.856	1276	12.868	1277	12.880	1278	12.892	1279	12.905
1280	12.917	1281	12.929	1282	12.941	1283	12.953	1284	12.965	1285	12.977	1286	12.989	1287	13.001	1288	13.014	1289	13.026
1290	13.038	1291	13.050	1292	13.062	1293	13.074	1294	13.086	1295	13.098	1296	13.111	1297	13.123	1298	13.135	1299	13.147
1300	13.159	1301	13.171	1302	13.183	1303	13.195	1304	13.208	1305	13.220	1306	13.232	1307	13.244	1308	13.256	1309	13.268
1310	13.280	1311	13.292	1312	13.305	1313	13.317	1314	13.329	1315	13.341	1316	13.353	1317	13.365	1318	13.377	1319	13.390
1320	13.402	1321	13.414	1322	13.426	1323	13.438	1324	13.450	1325	13.462	1326	13.474	1327	13.487	1328	13.499	1329	13.511
1330	13.523	1331	13.535	1332	13.547	1333	13.559	1334	13.572	1335	13.584	1336	13.596	1337	13.608	1338	13.620	1339	13.632
1340	13.644	1341	13.657	1342	13.669	1343	13.681	1344	13.693	1345	13.705	1346	13.717	1347	13.729	1348	13.742	1349	13.754
1350	13.766	1351	13.778	1352	13.790	1353	13.802	1354	13.814	1355	13.826	1356	13.839	1357	13.851	1358	13.863	1359	13.875
1360	13.887	1361	13.899	1362	13.911	1363	13.924	1364	13.936	1365	13.948	1366	13.960	1367	13.972	1368	13.984	1369	13.996
1370	14.009	1371	14.021	1372	14.033	1373	14.045	1374	14.057	1375	14.069	1376	14.081	1377	14.094	1378	14.106	1379	14.118
1380	14.130	1381	14.142	1382	14.154	1383	14.166	1384	14.178	1385	14.191	1386	14.203	1387	14.215	1388	14.227	1389	14.239
1390	14.251	1391	14.263	1392	14.276	1393	14.288	1394	14.300	1395	14.312	1396	14.324	1397	14.336	1398	14.348	1399	14.360
1400	14.373	1401	14.385	1402	14.397	1403	14.409	1404	14.421	1405	14.433	1406	14.445	1407	14.457	1408	14.470	1409	14.482
1410	14.494	1411	14.506	1412	14.518	1413	14.530	1414	14.542	1415	14.554	1416	14.567	1417	14.579	1418	14.591	1419	14.603
1420	14.615	1421	14.627	1422	14.639	1423	14.651	1424	14.664	1425	14.676	1426	14.688	1427	14.700	1428	14.712	1429	14.724
1430	14.736	1431	14.748	1432	14.760	1433	14.773	1434	14.785	1435	14.797	1436	14.809	1437	14.821	1438	14.833	1439	14.845
1440	14.857	1441	14.869	1442	14.881	1443	14.894	1444	14.906	1445	14.918	1446	14.930	1447	14.942	1448	14.954	1449	14.966

Type S Thermocouple																				
°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV	°C	mV
1450	14.978	1451	14.990	1452	15.002	1453	15.015	1454	15.027	1455	15.039	1456	15.051	1457	15.063	1458	15.075	1459	15.087
1460	15.099	1461	15.111	1462	15.123	1463	15.135	1464	15.148	1465	15.160	1466	15.172	1467	15.184	1468	15.196	1469	15.208
1470	15.220	1471	15.232	1472	15.244	1473	15.256	1474	15.268	1475	15.280	1476	15.292	1477	15.304	1478	15.317	1479	15.329
1480	15.341	1481	15.353	1482	15.365	1483	15.377	1484	15.389	1485	15.401	1486	15.413	1487	15.425	1488	15.437	1489	15.449
1490	15.461	1491	15.473	1492	15.485	1493	15.497	1494	15.509	1495	15.521	1496	15.534	1497	15.546	1498	15.558	1499	15.570
1500	15.582	1501	15.594	1502	15.606	1503	15.618	1504	15.630	1505	15.642	1506	15.654	1507	15.666	1508	15.678	1509	15.690
1510	15.702	1511	15.714	1512	15.726	1513	15.738	1514	15.750	1515	15.762	1516	15.774	1517	15.786	1518	15.798	1519	15.810
1520	15.822	1521	15.834	1522	15.846	1523	15.858	1524	15.870	1525	15.882	1526	15.894	1527	15.906	1528	15.918	1529	15.930
1530	15.942	1531	15.954	1532	15.966	1533	15.978	1534	15.990	1535	16.002	1536	16.014	1537	16.026	1538	16.038	1539	16.050
1540	16.062	1541	16.074	1542	16.086	1543	16.098	1544	16.110	1545	16.122	1546	16.134	1547	16.146	1548	16.158	1549	16.170
1550	16.182	1551	16.194	1552	16.205	1553	16.217	1554	16.229	1555	16.241	1556	16.253	1557	16.265	1558	16.277	1559	16.289
1560	16.301	1561	16.313	1562	16.325	1563	16.337	1564	16.349	1565	16.361	1566	16.373	1567	16.385	1568	16.396	1569	16.408
1570	16.420	1571	16.432	1572	16.444	1573	16.456	1574	16.468	1575	16.480	1576	16.492	1577	16.504	1578	16.516	1579	16.527
1580	16.539	1581	16.551	1582	16.563	1583	16.575	1584	16.587	1585	16.599	1586	16.611	1587	16.623	1588	16.634	1589	16.646
1590	16.658	1591	16.670	1592	16.682	1593	16.694	1594	16.706	1595	16.718	1596	16.729	1597	16.741	1598	16.753	1599	16.765
1600	16.777	1601	16.789	1602	16.801	1603	16.812	1604	16.824	1605	16.836	1606	16.848	1607	16.860	1608	16.872	1609	16.883
1610	16.895	1611	16.907	1612	16.919	1613	16.931	1614	16.943	1615	16.954	1616	16.966	1617	16.978	1618	16.990	1619	17.002
1620	17.013	1621	17.025	1622	17.037	1623	17.049	1624	17.061	1625	17.072	1626	17.084	1627	17.096	1628	17.108	1629	17.120
1630	17.131	1631	17.143	1632	17.155	1633	17.167	1634	17.178	1635	17.190	1636	17.202	1637	17.214	1638	17.225	1639	17.237
1640	17.249	1641	17.261	1642	17.272	1643	17.284	1644	17.296	1645	17.308	1646	17.319	1647	17.331	1648	17.343	1649	17.355
1650	17.366	1651	17.378	1652	17.390	1653	17.401	1654	17.413	1655	17.425	1656	17.437	1657	17.448	1658	17.460	1659	17.472
1660	17.483	1661	17.495	1662	17.507	1663	17.518	1664	17.530	1665	17.542	1666	17.553	1667	17.565	1668	17.577	1669	17.588
1670	17.600	1671	17.612	1672	17.623	1673	17.635	1674	17.647	1675	17.658	1676	17.670	1677	17.682	1678	17.693	1679	17.705
1680	17.717	1681	17.728	1682	17.740	1683	17.751	1684	17.763	1685	17.775	1686	17.786	1687	17.798	1688	17.809	1689	17.821
1690	17.832	1691	17.844	1692	17.855	1693	17.867	1694	17.878	1695	17.890	1696	17.901	1697	17.913	1698	17.924	1699	17.936
1700	17.947	1701	17.959	1702	17.970	1703	17.982	1704	17.993	1705	18.004	1706	18.016	1707	18.027	1708	18.039	1709	18.050
1710	18.061	1711	18.073	1712	18.084	1713	18.095	1714	18.107	1715	18.118	1716	18.129	1717	18.140	1718	18.152	1719	18.163
1720	18.174	1721	18.185	1722	18.196	1723	18.208	1724	18.219	1725	18.230	1726	18.241	1727	18.252	1728	18.263	1729	18.274
1730	18.285	1731	18.297	1732	18.308	1733	18.319	1734	18.330	1735	18.341	1736	18.352	1737	18.362	1738	18.373	1739	18.384
1740	18.395	1741	18.406	1742	18.417	1743	18.428	1744	18.439	1745	18.449	1746	18.460	1747	18.471	1748	18.482	1749	18.493
1750	18.503	1751	18.514	1752	18.525	1753	18.535	1754	18.546	1755	18.557	1756	18.567	1757	18.578	1758	18.588	1759	18.599
1760	18.609																		

Table 9 *Type S Thermocouple –50°F to 3210°F vs milliVolts*

Type S Thermocouple																				
°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
–50	–0.218	–49	–0.215	–48	–0.213	–47	–0.211	–46	–0.208	–45	–0.206	–44	–0.204	–43	–0.201	–42	–0.199	–41	–0.197
–40	–0.194	–39	–0.192	–38	–0.190	–37	–0.187	–36	–0.185	–35	–0.182	–34	–0.180	–33	–0.178	–32	–0.175	–31	–0.173
–30	–0.170	–29	–0.168	–28	–0.165	–27	–0.163	–26	–0.160	–25	–0.158	–24	–0.155	–23	–0.153	–22	–0.150	–21	–0.148
–20	–0.145	–19	–0.142	–18	–0.140	–17	–0.137	–16	–0.135	–15	–0.132	–14	–0.129	–13	–0.127	–12	–0.124	–11	–0.122
–10	–0.119	–9	–0.116	–8	–0.114	–7	–0.111	–6	–0.108	–5	–0.106	–4	–0.103	–3	–0.100	–2	–0.097	–1	–0.095
0	–0.092	1	–0.089	2	–0.086	3	–0.084	4	–0.081	5	–0.078	6	–0.075	7	–0.073	8	–0.070	9	–0.067
10	–0.064	11	–0.061	12	–0.058	13	–0.056	14	–0.053	15	–0.050	16	–0.047	17	–0.044	18	–0.041	19	–0.038
20	–0.035	21	–0.033	22	–0.030	23	–0.027	24	–0.024	25	–0.021	26	–0.018	27	–0.015	28	–0.012	29	–0.009
30	–0.006	31	–0.003	32	0.000	33	0.003	34	0.006	35	0.009	36	0.012	37	0.015	38	0.018	39	0.021
40	0.024	41	0.027	42	0.030	43	0.033	44	0.037	45	0.040	46	0.043	47	0.046	48	0.049	49	0.052
50	0.055	51	0.058	52	0.062	53	0.065	54	0.068	55	0.071	56	0.074	57	0.077	58	0.081	59	0.084
60	0.087	61	0.090	62	0.093	63	0.097	64	0.100	65	0.103	66	0.106	67	0.110	68	0.113	69	0.116
70	0.119	71	0.123	72	0.126	73	0.129	74	0.133	75	0.136	76	0.139	77	0.143	78	0.146	79	0.149
80	0.153	81	0.156	82	0.159	83	0.163	84	0.166	85	0.169	86	0.173	87	0.176	88	0.180	89	0.183
90	0.186	91	0.190	92	0.193	93	0.197	94	0.200	95	0.204	96	0.207	97	0.210	98	0.214	99	0.217
100	0.221	101	0.224	102	0.228	103	0.231	104	0.235	105	0.238	106	0.242	107	0.245	108	0.249	109	0.252
110	0.256	111	0.260	112	0.263	113	0.267	114	0.270	115	0.274	116	0.277	117	0.281	118	0.285	119	0.288
120	0.292	121	0.295	122	0.299	123	0.303	124	0.306	125	0.310	126	0.313	127	0.317	128	0.321	129	0.324
130	0.328	131	0.332	132	0.335	133	0.339	134	0.343	135	0.346	136	0.350	137	0.354	138	0.357	139	0.361
140	0.365	141	0.369	142	0.372	143	0.376	144	0.380	145	0.384	146	0.387	147	0.391	148	0.395	149	0.399
150	0.402	151	0.406	152	0.410	153	0.414	154	0.417	155	0.421	156	0.425	157	0.429	158	0.433	159	0.436
160	0.440	161	0.444	162	0.448	163	0.452	164	0.456	165	0.459	166	0.463	167	0.467	168	0.471	169	0.475
170	0.479	171	0.483	172	0.487	173	0.490	174	0.494	175	0.498	176	0.502	177	0.506	178	0.510	179	0.514
180	0.518	181	0.522	182	0.526	183	0.530	184	0.534	185	0.538	186	0.541	187	0.545	188	0.549	189	0.553
190	0.557	191	0.561	192	0.565	193	0.569	194	0.573	195	0.577	196	0.581	197	0.585	198	0.589	199	0.593
200	0.597	201	0.601	202	0.605	203	0.609	204	0.613	205	0.617	206	0.622	207	0.626	208	0.630	209	0.634
210	0.638	211	0.642	212	0.646	213	0.650	214	0.654	215	0.658	216	0.662	217	0.666	218	0.670	219	0.675
220	0.679	221	0.683	222	0.687	223	0.691	224	0.695	225	0.699	226	0.703	227	0.708	228	0.712	229	0.716
230	0.720	231	0.724	232	0.728	233	0.732	234	0.737	235	0.741	236	0.745	237	0.749	238	0.753	239	0.758
240	0.762	241	0.766	242	0.770	243	0.774	244	0.779	245	0.783	246	0.787	247	0.791	248	0.795	249	0.800
250	0.804	251	0.808	252	0.812	253	0.817	254	0.821	255	0.825	256	0.829	257	0.834	258	0.838	259	0.842
260	0.847	261	0.851	262	0.855	263	0.859	264	0.864	265	0.868	266	0.872	267	0.877	268	0.881	269	0.885
270	0.889	271	0.894	272	0.898	273	0.902	274	0.907	275	0.911	276	0.915	277	0.920	278	0.924	279	0.928
280	0.933	281	0.937	282	0.942	283	0.946	284	0.950	285	0.955	286	0.959	287	0.963	288	0.968	289	0.972
290	0.977	291	0.981	292	0.985	293	0.990	294	0.994	295	0.998	296	1.003	297	1.007	298	1.012	299	1.016

Type S Thermocouple																				
°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
300	1.021	301	1.025	302	1.029	303	1.034	304	1.038	305	1.043	306	1.047	307	1.052	308	1.056	309	1.061
310	1.065	311	1.069	312	1.074	313	1.078	314	1.083	315	1.087	316	1.092	317	1.096	318	1.101	319	1.105
320	1.110	321	1.114	322	1.119	323	1.123	324	1.128	325	1.132	326	1.137	327	1.141	328	1.146	329	1.150
330	1.155	331	1.159	332	1.164	333	1.168	334	1.173	335	1.177	336	1.182	337	1.186	338	1.191	339	1.196
340	1.200	341	1.205	342	1.209	343	1.214	344	1.218	345	1.223	346	1.227	347	1.232	348	1.237	349	1.241
350	1.246	351	1.250	352	1.255	353	1.260	354	1.264	355	1.269	356	1.273	357	1.278	358	1.283	359	1.287
360	1.292	361	1.296	362	1.301	363	1.306	364	1.310	365	1.315	366	1.319	367	1.324	368	1.329	369	1.333
370	1.338	371	1.343	372	1.347	373	1.352	374	1.357	375	1.361	376	1.366	377	1.371	378	1.375	379	1.380
380	1.385	381	1.389	382	1.394	383	1.399	384	1.403	385	1.408	386	1.413	387	1.417	388	1.422	389	1.427
390	1.431	391	1.436	392	1.441	393	1.445	394	1.450	395	1.455	396	1.460	397	1.464	398	1.469	399	1.474
400	1.478	401	1.483	402	1.488	403	1.493	404	1.497	405	1.502	406	1.507	407	1.512	408	1.516	409	1.521
410	1.526	411	1.531	412	1.535	413	1.540	414	1.545	415	1.550	416	1.554	417	1.559	418	1.564	419	1.569
420	1.573	421	1.578	422	1.583	423	1.588	424	1.592	425	1.597	426	1.602	427	1.607	428	1.612	429	1.616
430	1.621	431	1.626	432	1.631	433	1.636	434	1.640	435	1.645	436	1.650	437	1.655	438	1.660	439	1.664
440	1.669	441	1.674	442	1.679	443	1.684	444	1.689	445	1.693	446	1.698	447	1.703	448	1.708	449	1.713
450	1.718	451	1.722	452	1.727	453	1.732	454	1.737	455	1.742	456	1.747	457	1.752	458	1.756	459	1.761
460	1.766	461	1.771	462	1.776	463	1.781	464	1.786	465	1.790	466	1.795	467	1.800	468	1.805	469	1.810
470	1.815	471	1.820	472	1.825	473	1.829	474	1.834	475	1.839	476	1.844	477	1.849	478	1.854	479	1.859
480	1.864	481	1.869	482	1.874	483	1.878	484	1.883	485	1.888	486	1.893	487	1.898	488	1.903	489	1.908
490	1.913	491	1.918	492	1.923	493	1.928	494	1.933	495	1.938	496	1.942	497	1.947	498	1.952	499	1.957
500	1.962	501	1.967	502	1.972	503	1.977	504	1.982	505	1.987	506	1.992	507	1.997	508	2.002	509	2.007
510	2.012	511	2.017	512	2.022	513	2.027	514	2.032	515	2.037	516	2.042	517	2.047	518	2.052	519	2.057
520	2.062	521	2.067	522	2.072	523	2.076	524	2.081	525	2.086	526	2.091	527	2.096	528	2.101	529	2.106
530	2.111	531	2.116	532	2.121	533	2.126	534	2.131	535	2.136	536	2.141	537	2.147	538	2.152	539	2.157
540	2.162	541	2.167	542	2.172	543	2.177	544	2.182	545	2.187	546	2.192	547	2.197	548	2.202	549	2.207
550	2.212	551	2.217	552	2.222	553	2.227	554	2.232	555	2.237	556	2.242	557	2.247	558	2.252	559	2.257
560	2.262	561	2.267	562	2.272	563	2.277	564	2.283	565	2.288	566	2.293	567	2.298	568	2.303	569	2.308
570	2.313	571	2.318	572	2.323	573	2.328	574	2.333	575	2.338	576	2.343	577	2.348	578	2.354	579	2.359
580	2.364	581	2.369	582	2.374	583	2.379	584	2.384	585	2.389	586	2.394	587	2.399	588	2.404	589	2.410
590	2.415	591	2.420	592	2.425	593	2.430	594	2.435	595	2.440	596	2.445	597	2.450	598	2.455	599	2.461
600	2.466	601	2.471	602	2.476	603	2.481	604	2.486	605	2.491	606	2.496	607	2.502	608	2.507	609	2.512
610	2.517	611	2.522	612	2.527	613	2.532	614	2.537	615	2.543	616	2.548	617	2.553	618	2.558	619	2.563
620	2.568	621	2.574	622	2.579	623	2.584	624	2.589	625	2.594	626	2.599	627	2.604	628	2.610	629	2.615
630	2.620	631	2.625	632	2.630	633	2.635	634	2.641	635	2.646	636	2.651	637	2.656	638	2.661	639	2.666
640	2.672	641	2.677	642	2.682	643	2.687	644	2.692	645	2.697	646	2.703	647	2.708	648	2.713	649	2.718
650	2.723	651	2.729	652	2.734	653	2.739	654	2.744	655	2.749	656	2.755	657	2.760	658	2.765	659	2.770
660	2.775	661	2.781	662	2.786	663	2.791	664	2.796	665	2.801	666	2.807	667	2.812	668	2.817	669	2.822
670	2.827	671	2.833	672	2.838	673	2.843	674	2.848	675	2.854	676	2.859	677	2.864	678	2.869	679	2.874
680	2.880	681	2.885	682	2.890	683	2.895	684	2.901	685	2.906	686	2.911	687	2.916	688	2.922	689	2.927

Type S Thermocouple																				
°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	
690	2.932	691	2.937	692	2.943	693	2.948	694	2.953	695	2.958	696	2.964	697	2.969	698	2.974	699	2.979	
700	2.985	701	2.990	702	2.995	703	3.000	704	3.006	705	3.011	706	3.016	707	3.021	708	3.027	709	3.032	
710	3.037	711	3.042	712	3.048	713	3.053	714	3.058	715	3.063	716	3.069	717	3.074	718	3.079	719	3.085	
720	3.090	721	3.095	722	3.100	723	3.106	724	3.111	725	3.116	726	3.122	727	3.127	728	3.132	729	3.137	
730	3.143	731	3.148	732	3.153	733	3.159	734	3.164	735	3.169	736	3.174	737	3.180	738	3.185	739	3.190	
740	3.196	741	3.201	742	3.206	743	3.212	744	3.217	745	3.222	746	3.227	747	3.233	748	3.238	749	3.243	
750	3.249	751	3.254	752	3.259	753	3.265	754	3.270	755	3.275	756	3.281	757	3.286	758	3.291	759	3.297	
760	3.302	761	3.307	762	3.313	763	3.318	764	3.323	765	3.329	766	3.334	767	3.339	768	3.345	769	3.350	
770	3.355	771	3.361	772	3.366	773	3.371	774	3.377	775	3.382	776	3.387	777	3.393	778	3.398	779	3.403	
780	3.409	781	3.414	782	3.419	783	3.425	784	3.430	785	3.435	786	3.441	787	3.446	788	3.451	789	3.457	
790	3.462	791	3.468	792	3.473	793	3.478	794	3.484	795	3.489	796	3.494	797	3.500	798	3.505	799	3.510	
800	3.516	801	3.521	802	3.527	803	3.532	804	3.537	805	3.543	806	3.548	807	3.553	808	3.559	809	3.564	
810	3.570	811	3.575	812	3.580	813	3.586	814	3.591	815	3.596	816	3.602	817	3.607	818	3.613	819	3.618	
820	3.623	821	3.629	822	3.634	823	3.640	824	3.645	825	3.650	826	3.656	827	3.661	828	3.667	829	3.672	
830	3.677	831	3.683	832	3.688	833	3.694	834	3.699	835	3.704	836	3.710	837	3.715	838	3.721	839	3.726	
840	3.731	841	3.737	842	3.742	843	3.748	844	3.753	845	3.758	846	3.764	847	3.769	848	3.775	849	3.780	
850	3.786	851	3.791	852	3.796	853	3.802	854	3.807	855	3.813	856	3.818	857	3.823	858	3.829	859	3.834	
860	3.840	861	3.845	862	3.851	863	3.856	864	3.862	865	3.867	866	3.872	867	3.878	868	3.883	869	3.889	
870	3.894	871	3.900	872	3.905	873	3.910	874	3.916	875	3.921	876	3.927	877	3.932	878	3.938	879	3.943	
880	3.949	881	3.954	882	3.959	883	3.965	884	3.970	885	3.976	886	3.981	887	3.987	888	3.992	889	3.998	
890	4.003	891	4.009	892	4.014	893	4.020	894	4.025	895	4.030	896	4.036	897	4.041	898	4.047	899	4.052	
900	4.058	901	4.063	902	4.069	903	4.074	904	4.080	905	4.085	906	4.091	907	4.096	908	4.102	909	4.107	
910	4.113	911	4.118	912	4.123	913	4.129	914	4.134	915	4.140	916	4.145	917	4.151	918	4.156	919	4.162	
920	4.167	921	4.173	922	4.178	923	4.184	924	4.189	925	4.195	926	4.200	927	4.206	928	4.211	929	4.217	
930	4.222	931	4.228	932	4.233	933	4.239	934	4.244	935	4.250	936	4.255	937	4.261	938	4.266	939	4.272	
940	4.277	941	4.283	942	4.288	943	4.294	944	4.299	945	4.305	946	4.310	947	4.316	948	4.321	949	4.327	
950	4.332	951	4.338	952	4.343	953	4.349	954	4.355	955	4.360	956	4.366	957	4.371	958	4.377	959	4.382	
960	4.388	961	4.393	962	4.399	963	4.404	964	4.410	965	4.415	966	4.421	967	4.426	968	4.432	969	4.437	
970	4.443	971	4.449	972	4.454	973	4.460	974	4.465	975	4.471	976	4.476	977	4.482	978	4.487	979	4.493	
980	4.498	981	4.504	982	4.510	983	4.515	984	4.521	985	4.526	986	4.532	987	4.537	988	4.543	989	4.548	
990	4.554	991	4.559	992	4.565	993	4.571	994	4.576	995	4.582	996	4.587	997	4.593	998	4.598	999	4.604	
1000	4.610	1001	4.615	1002	4.621	1003	4.626	1004	4.632	1005	4.637	1006	4.643	1007	4.648	1008	4.654	1009	4.660	
1010	4.665	1011	4.671	1012	4.676	1013	4.682	1014	4.688	1015	4.693	1016	4.699	1017	4.704	1018	4.710	1019	4.715	
1020	4.721	1021	4.727	1022	4.732	1023	4.738	1024	4.743	1025	4.749	1026	4.755	1027	4.760	1028	4.766	1029	4.771	
1030	4.777	1031	4.782	1032	4.788	1033	4.794	1034	4.799	1035	4.805	1036	4.810	1037	4.816	1038	4.822	1039	4.827	
1040	4.833	1041	4.838	1042	4.844	1043	4.850	1044	4.855	1045	4.861	1046	4.866	1047	4.872	1048	4.878	1049	4.883	
1050	4.889	1051	4.895	1052	4.900	1053	4.906	1054	4.911	1055	4.917	1056	4.923	1057	4.928	1058	4.934	1059	4.939	
1060	4.945	1061	4.951	1062	4.956	1063	4.962	1064	4.968	1065	4.973	1066	4.979	1067	4.984	1068	4.990	1069	4.996	
1070	5.001	1071	5.007	1072	5.013	1073	5.018	1074	5.024	1075	5.030	1076	5.035	1077	5.041	1078	5.046	1079	5.052	

Type S Thermocouple																				
°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
1080	5.058	1081	5.063	1082	5.069	1083	5.075	1084	5.080	1085	5.086	1086	5.092	1087	5.097	1088	5.103	1089	5.109
1090	5.114	1091	5.120	1092	5.125	1093	5.131	1094	5.137	1095	5.142	1096	5.148	1097	5.154	1098	5.159	1099	5.165
1100	5.171	1101	5.176	1102	5.182	1103	5.188	1104	5.193	1105	5.199	1106	5.205	1107	5.210	1108	5.216	1109	5.222
1110	5.227	1111	5.233	1112	5.239	1113	5.244	1114	5.250	1115	5.256	1116	5.261	1117	5.267	1118	5.273	1119	5.278
1120	5.284	1121	5.290	1122	5.295	1123	5.301	1124	5.307	1125	5.312	1126	5.318	1127	5.324	1128	5.330	1129	5.335
1130	5.341	1131	5.347	1132	5.352	1133	5.358	1134	5.364	1135	5.369	1136	5.375	1137	5.381	1138	5.386	1139	5.392
1140	5.398	1141	5.404	1142	5.409	1143	5.415	1144	5.421	1145	5.426	1146	5.432	1147	5.438	1148	5.443	1149	5.449
1150	5.455	1151	5.461	1152	5.466	1153	5.472	1154	5.478	1155	5.483	1156	5.489	1157	5.495	1158	5.501	1159	5.506
1160	5.512	1161	5.518	1162	5.523	1163	5.529	1164	5.535	1165	5.541	1166	5.546	1167	5.552	1168	5.558	1169	5.563
1170	5.569	1171	5.575	1172	5.581	1173	5.586	1174	5.592	1175	5.598	1176	5.604	1177	5.609	1178	5.615	1179	5.621
1180	5.627	1181	5.632	1182	5.638	1183	5.644	1184	5.649	1185	5.655	1186	5.661	1187	5.667	1188	5.672	1189	5.678
1190	5.684	1191	5.690	1192	5.695	1193	5.701	1194	5.707	1195	5.713	1196	5.718	1197	5.724	1198	5.730	1199	5.736
1200	5.741	1201	5.747	1202	5.753	1203	5.759	1204	5.764	1205	5.770	1206	5.776	1207	5.782	1208	5.788	1209	5.793
1210	5.799	1211	5.805	1212	5.811	1213	5.816	1214	5.822	1215	5.828	1216	5.834	1217	5.839	1218	5.845	1219	5.851
1220	5.857	1221	5.863	1222	5.868	1223	5.874	1224	5.880	1225	5.886	1226	5.891	1227	5.897	1228	5.903	1229	5.909
1230	5.915	1231	5.920	1232	5.926	1233	5.932	1234	5.938	1235	5.944	1236	5.949	1237	5.955	1238	5.961	1239	5.967
1240	5.972	1241	5.978	1242	5.984	1243	5.990	1244	5.996	1245	6.001	1246	6.007	1247	6.013	1248	6.019	1249	6.025
1250	6.030	1251	6.036	1252	6.042	1253	6.048	1254	6.054	1255	6.060	1256	6.065	1257	6.071	1258	6.077	1259	6.083
1260	6.089	1261	6.094	1262	6.100	1263	6.106	1264	6.112	1265	6.118	1266	6.124	1267	6.129	1268	6.135	1269	6.141
1270	6.147	1271	6.153	1272	6.158	1273	6.164	1274	6.170	1275	6.176	1276	6.182	1277	6.188	1278	6.193	1279	6.199
1280	6.205	1281	6.211	1282	6.217	1283	6.223	1284	6.228	1285	6.234	1286	6.240	1287	6.246	1288	6.252	1289	6.258
1290	6.264	1291	6.269	1292	6.275	1293	6.281	1294	6.287	1295	6.293	1296	6.299	1297	6.305	1298	6.310	1299	6.316
1300	6.322	1301	6.328	1302	6.334	1303	6.340	1304	6.346	1305	6.351	1306	6.357	1307	6.363	1308	6.369	1309	6.375
1310	6.381	1311	6.387	1312	6.392	1313	6.398	1314	6.404	1315	6.410	1316	6.416	1317	6.422	1318	6.428	1319	6.434
1320	6.439	1321	6.445	1322	6.451	1323	6.457	1324	6.463	1325	6.469	1326	6.475	1327	6.481	1328	6.486	1329	6.492
1330	6.498	1331	6.504	1332	6.510	1333	6.516	1334	6.522	1335	6.528	1336	6.534	1337	6.539	1338	6.545	1339	6.551
1340	6.557	1341	6.563	1342	6.569	1343	6.575	1344	6.581	1345	6.587	1346	6.593	1347	6.598	1348	6.604	1349	6.610
1350	6.616	1351	6.622	1352	6.628	1353	6.634	1354	6.640	1355	6.646	1356	6.652	1357	6.658	1358	6.664	1359	6.669
1360	6.675	1361	6.681	1362	6.687	1363	6.693	1364	6.699	1365	6.705	1366	6.711	1367	6.717	1368	6.723	1369	6.729
1370	6.735	1371	6.741	1372	6.746	1373	6.752	1374	6.758	1375	6.764	1376	6.770	1377	6.776	1378	6.782	1379	6.788
1380	6.794	1381	6.800	1382	6.806	1383	6.812	1384	6.818	1385	6.824	1386	6.830	1387	6.836	1388	6.842	1389	6.847
1390	6.853	1391	6.859	1392	6.865	1393	6.871	1394	6.877	1395	6.883	1396	6.889	1397	6.895	1398	6.901	1399	6.907
1400	6.913	1401	6.919	1402	6.925	1403	6.931	1404	6.937	1405	6.943	1406	6.949	1407	6.955	1408	6.961	1409	6.967
1410	6.973	1411	6.979	1412	6.985	1413	6.991	1414	6.997	1415	7.003	1416	7.008	1417	7.014	1418	7.020	1419	7.026
1420	7.032	1421	7.038	1422	7.044	1423	7.050	1424	7.056	1425	7.062	1426	7.068	1427	7.074	1428	7.080	1429	7.086
1430	7.092	1431	7.098	1432	7.104	1433	7.110	1434	7.116	1435	7.122	1436	7.128	1437	7.134	1438	7.140	1439	7.146
1440	7.152	1441	7.158	1442	7.164	1443	7.170	1444	7.176	1445	7.182	1446	7.188	1447	7.194	1448	7.200	1449	7.206
1450	7.212	1451	7.218	1452	7.224	1453	7.230	1454	7.236	1455	7.242	1456	7.249	1457	7.255	1458	7.261	1459	7.267
1460	7.273	1461	7.279	1462	7.285	1463	7.291	1464	7.297	1465	7.303	1466	7.309	1467	7.315	1468	7.321	1469	7.327

Type S Thermocouple																				
°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	
1470	7.333	1471	7.339	1472	7.345	1473	7.351	1474	7.357	1475	7.363	1476	7.369	1477	7.375	1478	7.381	1479	7.387	
1480	7.393	1481	7.399	1482	7.405	1483	7.411	1484	7.418	1485	7.424	1486	7.430	1487	7.436	1488	7.442	1489	7.448	
1490	7.454	1491	7.460	1492	7.466	1493	7.472	1494	7.478	1495	7.484	1496	7.490	1497	7.496	1498	7.502	1499	7.508	
1500	7.514	1501	7.521	1502	7.527	1503	7.533	1504	7.539	1505	7.545	1506	7.551	1507	7.557	1508	7.563	1509	7.569	
1510	7.575	1511	7.581	1512	7.587	1513	7.593	1514	7.600	1515	7.606	1516	7.612	1517	7.618	1518	7.624	1519	7.630	
1520	7.636	1521	7.642	1522	7.648	1523	7.654	1524	7.660	1525	7.667	1526	7.673	1527	7.679	1528	7.685	1529	7.691	
1530	7.697	1531	7.703	1532	7.709	1533	7.715	1534	7.721	1535	7.728	1536	7.734	1537	7.740	1538	7.746	1539	7.752	
1540	7.758	1541	7.764	1542	7.770	1543	7.776	1544	7.783	1545	7.789	1546	7.795	1547	7.801	1548	7.807	1549	7.813	
1550	7.819	1551	7.825	1552	7.832	1553	7.838	1554	7.844	1555	7.850	1556	7.856	1557	7.862	1558	7.868	1559	7.874	
1560	7.881	1561	7.887	1562	7.893	1563	7.899	1564	7.905	1565	7.911	1566	7.917	1567	7.923	1568	7.930	1569	7.936	
1570	7.942	1571	7.948	1572	7.954	1573	7.960	1574	7.966	1575	7.973	1576	7.979	1577	7.985	1578	7.991	1579	7.997	
1580	8.003	1581	8.010	1582	8.016	1583	8.022	1584	8.028	1585	8.034	1586	8.040	1587	8.047	1588	8.053	1589	8.059	
1590	8.065	1591	8.071	1592	8.077	1593	8.083	1594	8.090	1595	8.096	1596	8.102	1597	8.108	1598	8.114	1599	8.121	
1600	8.127	1601	8.133	1602	8.139	1603	8.145	1604	8.151	1605	8.158	1606	8.164	1607	8.170	1608	8.176	1609	8.182	
1610	8.189	1611	8.195	1612	8.201	1613	8.207	1614	8.213	1615	8.219	1616	8.226	1617	8.232	1618	8.238	1619	8.244	
1620	8.250	1621	8.257	1622	8.263	1623	8.269	1624	8.275	1625	8.281	1626	8.288	1627	8.294	1628	8.300	1629	8.306	
1630	8.312	1631	8.319	1632	8.325	1633	8.331	1634	8.337	1635	8.343	1636	8.350	1637	8.356	1638	8.362	1639	8.368	
1640	8.375	1641	8.381	1642	8.387	1643	8.393	1644	8.399	1645	8.406	1646	8.412	1647	8.418	1648	8.424	1649	8.431	
1650	8.437	1651	8.443	1652	8.449	1653	8.455	1654	8.462	1655	8.468	1656	8.474	1657	8.480	1658	8.487	1659	8.493	
1660	8.499	1661	8.505	1662	8.512	1663	8.518	1664	8.524	1665	8.530	1666	8.537	1667	8.543	1668	8.549	1669	8.555	
1670	8.562	1671	8.568	1672	8.574	1673	8.580	1674	8.587	1675	8.593	1676	8.599	1677	8.605	1678	8.612	1679	8.618	
1680	8.624	1681	8.630	1682	8.637	1683	8.643	1684	8.649	1685	8.655	1686	8.662	1687	8.668	1688	8.674	1689	8.680	
1690	8.687	1691	8.693	1692	8.699	1693	8.706	1694	8.712	1695	8.718	1696	8.724	1697	8.731	1698	8.737	1699	8.743	
1700	8.749	1701	8.756	1702	8.762	1703	8.768	1704	8.775	1705	8.781	1706	8.787	1707	8.793	1708	8.800	1709	8.806	
1710	8.812	1711	8.819	1712	8.825	1713	8.831	1714	8.837	1715	8.844	1716	8.850	1717	8.856	1718	8.863	1719	8.869	
1720	8.875	1721	8.882	1722	8.888	1723	8.894	1724	8.900	1725	8.907	1726	8.913	1727	8.919	1728	8.926	1729	8.932	
1730	8.938	1731	8.945	1732	8.951	1733	8.957	1734	8.964	1735	8.970	1736	8.976	1737	8.983	1738	8.989	1739	8.995	
1740	9.001	1741	9.008	1742	9.014	1743	9.020	1744	9.027	1745	9.033	1746	9.039	1747	9.046	1748	9.052	1749	9.058	
1750	9.065	1751	9.071	1752	9.077	1753	9.084	1754	9.090	1755	9.096	1756	9.103	1757	9.109	1758	9.115	1759	9.122	
1760	9.128	1761	9.134	1762	9.141	1763	9.147	1764	9.153	1765	9.160	1766	9.166	1767	9.172	1768	9.179	1769	9.185	
1770	9.192	1771	9.198	1772	9.204	1773	9.211	1774	9.217	1775	9.223	1776	9.230	1777	9.236	1778	9.242	1779	9.249	
1780	9.255	1781	9.261	1782	9.268	1783	9.274	1784	9.281	1785	9.287	1786	9.293	1787	9.300	1788	9.306	1789	9.312	
1790	9.319	1791	9.325	1792	9.331	1793	9.338	1794	9.344	1795	9.351	1796	9.357	1797	9.363	1798	9.370	1799	9.376	
1800	9.382	1801	9.389	1802	9.395	1803	9.402	1804	9.408	1805	9.414	1806	9.421	1807	9.427	1808	9.434	1809	9.440	
1810	9.446	1811	9.453	1812	9.459	1813	9.465	1814	9.472	1815	9.478	1816	9.485	1817	9.491	1818	9.497	1819	9.504	
1820	9.510	1821	9.517	1822	9.523	1823	9.529	1824	9.536	1825	9.542	1826	9.549	1827	9.555	1828	9.561	1829	9.568	
1830	9.574	1831	9.581	1832	9.587	1833	9.594	1834	9.600	1835	9.606	1836	9.613	1837	9.619	1838	9.626	1839	9.632	
1840	9.638	1841	9.645	1842	9.651	1843	9.658	1844	9.664	1845	9.671	1846	9.677	1847	9.683	1848	9.690	1849	9.696	
1850	9.703	1851	9.709	1852	9.716	1853	9.722	1854	9.728	1855	9.735	1856	9.741	1857	9.748	1858	9.754	1859	9.761	

Type S Thermocouple																				
°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
1860	9.767	1861	9.773	1862	9.780	1863	9.786	1864	9.793	1865	9.799	1866	9.806	1867	9.812	1868	9.819	1869	9.825
1870	9.831	1871	9.838	1872	9.844	1873	9.851	1874	9.857	1875	9.864	1876	9.870	1877	9.877	1878	9.883	1879	9.889
1880	9.896	1881	9.902	1882	9.909	1883	9.915	1884	9.922	1885	9.928	1886	9.935	1887	9.941	1888	9.948	1889	9.954
1890	9.961	1891	9.967	1892	9.973	1893	9.980	1894	9.986	1895	9.993	1896	9.999	1897	10.006	1898	10.012	1899	10.019
1900	10.025	1901	10.032	1902	10.038	1903	10.045	1904	10.051	1905	10.058	1906	10.064	1907	10.071	1908	10.077	1909	10.084
1910	10.090	1911	10.097	1912	10.103	1913	10.110	1914	10.116	1915	10.123	1916	10.129	1917	10.136	1918	10.142	1919	10.149
1920	10.155	1921	10.162	1922	10.168	1923	10.175	1924	10.181	1925	10.188	1926	10.194	1927	10.201	1928	10.207	1929	10.214
1930	10.220	1931	10.227	1932	10.233	1933	10.240	1934	10.246	1935	10.253	1936	10.259	1937	10.266	1938	10.272	1939	10.279
1940	10.285	1941	10.292	1942	10.298	1943	10.305	1944	10.311	1945	10.318	1946	10.324	1947	10.331	1948	10.337	1949	10.344
1950	10.350	1951	10.357	1952	10.363	1953	10.370	1954	10.376	1955	10.383	1956	10.390	1957	10.396	1958	10.403	1959	10.409
1960	10.416	1961	10.422	1962	10.429	1963	10.435	1964	10.442	1965	10.448	1966	10.455	1967	10.461	1968	10.468	1969	10.475
1970	10.481	1971	10.488	1972	10.494	1973	10.501	1974	10.507	1975	10.514	1976	10.520	1977	10.527	1978	10.533	1979	10.540
1980	10.547	1981	10.553	1982	10.560	1983	10.566	1984	10.573	1985	10.579	1986	10.586	1987	10.592	1988	10.599	1989	10.606
1990	10.612	1991	10.619	1992	10.625	1993	10.632	1994	10.638	1995	10.645	1996	10.651	1997	10.658	1998	10.665	1999	10.671
2000	10.678	2001	10.684	2002	10.691	2003	10.697	2004	10.704	2005	10.711	2006	10.717	2007	10.724	2008	10.730	2009	10.737
2010	10.743	2011	10.750	2012	10.757	2013	10.763	2014	10.770	2015	10.776	2016	10.783	2017	10.789	2018	10.796	2019	10.803
2020	10.809	2021	10.816	2022	10.822	2023	10.829	2024	10.836	2025	10.842	2026	10.849	2027	10.855	2028	10.862	2029	10.868
2030	10.875	2031	10.882	2032	10.888	2033	10.895	2034	10.901	2035	10.908	2036	10.915	2037	10.921	2038	10.928	2039	10.934
2040	10.941	2041	10.948	2042	10.954	2043	10.961	2044	10.967	2045	10.974	2046	10.981	2047	10.987	2048	10.994	2049	11.000
2050	11.007	2051	11.014	2052	11.020	2053	11.027	2054	11.033	2055	11.040	2056	11.047	2057	11.053	2058	11.060	2059	11.066
2060	11.073	2061	11.080	2062	11.086	2063	11.093	2064	11.099	2065	11.106	2066	11.113	2067	11.119	2068	11.126	2069	11.132
2070	11.139	2071	11.146	2072	11.152	2073	11.159	2074	11.166	2075	11.172	2076	11.179	2077	11.185	2078	11.192	2079	11.199
2080	11.205	2081	11.212	2082	11.219	2083	11.225	2084	11.232	2085	11.238	2086	11.245	2087	11.252	2088	11.258	2089	11.265
2090	11.272	2091	11.278	2092	11.285	2093	11.291	2094	11.298	2095	11.305	2096	11.311	2097	11.318	2098	11.325	2099	11.331
2100	11.338	2101	11.345	2102	11.351	2103	11.358	2104	11.364	2105	11.371	2106	11.378	2107	11.384	2108	11.391	2109	11.398
2110	11.404	2111	11.411	2112	11.418	2113	11.424	2114	11.431	2115	11.437	2116	11.444	2117	11.451	2118	11.457	2119	11.464
2120	11.471	2121	11.477	2122	11.484	2123	11.491	2124	11.497	2125	11.504	2126	11.511	2127	11.517	2128	11.524	2129	11.531
2130	11.537	2131	11.544	2132	11.550	2133	11.557	2134	11.564	2135	11.570	2136	11.577	2137	11.584	2138	11.590	2139	11.597
2140	11.604	2141	11.610	2142	11.617	2143	11.624	2144	11.630	2145	11.637	2146	11.644	2147	11.650	2148	11.657	2149	11.664
2150	11.670	2151	11.677	2152	11.684	2153	11.690	2154	11.697	2155	11.704	2156	11.710	2157	11.717	2158	11.724	2159	11.730
2160	11.737	2161	11.744	2162	11.750	2163	11.757	2164	11.764	2165	11.770	2166	11.777	2167	11.784	2168	11.790	2169	11.797
2170	11.804	2171	11.810	2172	11.817	2173	11.824	2174	11.830	2175	11.837	2176	11.844	2177	11.850	2178	11.857	2179	11.864
2180	11.870	2181	11.877	2182	11.884	2183	11.890	2184	11.897	2185	11.904	2186	11.910	2187	11.917	2188	11.924	2189	11.931
2190	11.937	2191	11.944	2192	11.951	2193	11.957	2194	11.964	2195	11.971	2196	11.977	2197	11.984	2198	11.991	2199	11.997
2200	12.004	2201	12.011	2202	12.017	2203	12.024	2204	12.031	2205	12.037	2206	12.044	2207	12.051	2208	12.058	2209	12.064
2210	12.071	2211	12.078	2212	12.084	2213	12.091	2214	12.098	2215	12.104	2216	12.111	2217	12.118	2218	12.124	2219	12.131
2220	12.138	2221	12.145	2222	12.151	2223	12.158	2224	12.165	2225	12.171	2226	12.178	2227	12.185	2228	12.191	2229	12.198
2230	12.205	2231	12.211	2232	12.218	2233	12.225	2234	12.232	2235	12.238	2236	12.245	2237	12.252	2238	12.258	2239	12.265
2240	12.272	2241	12.278	2242	12.285	2243	12.292	2244	12.299	2245	12.305	2246	12.312	2247	12.319	2248	12.325	2249	12.332

Type S Thermocouple																				
°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
2250	12.339	2251	12.346	2252	12.352	2253	12.359	2254	12.366	2255	12.372	2256	12.379	2257	12.386	2258	12.392	2259	12.399
2260	12.406	2261	12.413	2262	12.419	2263	12.426	2264	12.433	2265	12.439	2266	12.446	2267	12.453	2268	12.460	2269	12.466
2270	12.473	2271	12.480	2272	12.486	2273	12.493	2274	12.500	2275	12.507	2276	12.513	2277	12.520	2278	12.527	2279	12.533
2280	12.540	2281	12.547	2282	12.554	2283	12.560	2284	12.567	2285	12.574	2286	12.580	2287	12.587	2288	12.594	2289	12.601
2290	12.607	2291	12.614	2292	12.621	2293	12.627	2294	12.634	2295	12.641	2296	12.648	2297	12.654	2298	12.661	2299	12.668
2300	12.675	2301	12.681	2302	12.688	2303	12.695	2304	12.701	2305	12.708	2306	12.715	2307	12.722	2308	12.728	2309	12.735
2310	12.742	2311	12.748	2312	12.755	2313	12.762	2314	12.769	2315	12.775	2316	12.782	2317	12.789	2318	12.796	2319	12.802
2320	12.809	2321	12.816	2322	12.822	2323	12.829	2324	12.836	2325	12.843	2326	12.849	2327	12.856	2328	12.863	2329	12.870
2330	12.876	2331	12.883	2332	12.890	2333	12.896	2334	12.903	2335	12.910	2336	12.917	2337	12.923	2338	12.930	2339	12.937
2340	12.944	2341	12.950	2342	12.957	2343	12.964	2344	12.971	2345	12.977	2346	12.984	2347	12.991	2348	12.997	2349	13.004
2350	13.011	2351	13.018	2352	13.024	2353	13.031	2354	13.038	2355	13.045	2356	13.051	2357	13.058	2358	13.065	2359	13.072
2360	13.078	2361	13.085	2362	13.092	2363	13.098	2364	13.105	2365	13.112	2366	13.119	2367	13.125	2368	13.132	2369	13.139
2370	13.146	2371	13.152	2372	13.159	2373	13.166	2374	13.173	2375	13.179	2376	13.186	2377	13.193	2378	13.199	2379	13.206
2380	13.213	2381	13.220	2382	13.226	2383	13.233	2384	13.240	2385	13.247	2386	13.253	2387	13.260	2388	13.267	2389	13.274
2390	13.280	2391	13.287	2392	13.294	2393	13.301	2394	13.307	2395	13.314	2396	13.321	2397	13.328	2398	13.334	2399	13.341
2400	13.348	2401	13.354	2402	13.361	2403	13.368	2404	13.375	2405	13.381	2406	13.388	2407	13.395	2408	13.402	2409	13.408
2410	13.415	2411	13.422	2412	13.429	2413	13.435	2414	13.442	2415	13.449	2416	13.456	2417	13.462	2418	13.469	2419	13.476
2420	13.483	2421	13.489	2422	13.496	2423	13.503	2424	13.510	2425	13.516	2426	13.523	2427	13.530	2428	13.537	2429	13.543
2430	13.550	2431	13.557	2432	13.563	2433	13.570	2434	13.577	2435	13.584	2436	13.590	2437	13.597	2438	13.604	2439	13.611
2440	13.617	2441	13.624	2442	13.631	2443	13.638	2444	13.644	2445	13.651	2446	13.658	2447	13.665	2448	13.671	2449	13.678
2450	13.685	2451	13.692	2452	13.698	2453	13.705	2454	13.712	2455	13.719	2456	13.725	2457	13.732	2458	13.739	2459	13.746
2460	13.752	2461	13.759	2462	13.766	2463	13.773	2464	13.779	2465	13.786	2466	13.793	2467	13.800	2468	13.806	2469	13.813
2470	13.820	2471	13.826	2472	13.833	2473	13.840	2474	13.847	2475	13.853	2476	13.860	2477	13.867	2478	13.874	2479	13.880
2480	13.887	2481	13.894	2482	13.901	2483	13.907	2484	13.914	2485	13.921	2486	13.928	2487	13.934	2488	13.941	2489	13.948
2490	13.955	2491	13.961	2492	13.968	2493	13.975	2494	13.982	2495	13.988	2496	13.995	2497	14.002	2498	14.009	2499	14.015
2500	14.022	2501	14.029	2502	14.036	2503	14.042	2504	14.049	2505	14.056	2506	14.063	2507	14.069	2508	14.076	2509	14.083
2510	14.089	2511	14.096	2512	14.103	2513	14.110	2514	14.116	2515	14.123	2516	14.130	2517	14.137	2518	14.143	2519	14.150
2520	14.157	2521	14.164	2522	14.170	2523	14.177	2524	14.184	2525	14.191	2526	14.197	2527	14.204	2528	14.211	2529	14.218
2530	14.224	2531	14.231	2532	14.238	2533	14.245	2534	14.251	2535	14.258	2536	14.265	2537	14.272	2538	14.278	2539	14.285
2540	14.292	2541	14.298	2542	14.305	2543	14.312	2544	14.319	2545	14.325	2546	14.332	2547	14.339	2548	14.346	2549	14.352
2550	14.359	2551	14.366	2552	14.373	2553	14.379	2554	14.386	2555	14.393	2556	14.400	2557	14.406	2558	14.413	2559	14.420
2560	14.426	2561	14.433	2562	14.440	2563	14.447	2564	14.453	2565	14.460	2566	14.467	2567	14.474	2568	14.480	2569	14.487
2570	14.494	2571	14.501	2572	14.507	2573	14.514	2574	14.521	2575	14.528	2576	14.534	2577	14.541	2578	14.548	2579	14.554
2580	14.561	2581	14.568	2582	14.575	2583	14.581	2584	14.588	2585	14.595	2586	14.602	2587	14.608	2588	14.615	2589	14.622
2590	14.629	2591	14.635	2592	14.642	2593	14.649	2594	14.655	2595	14.662	2596	14.669	2597	14.676	2598	14.682	2599	14.689
2600	14.696	2601	14.703	2602	14.709	2603	14.716	2604	14.723	2605	14.729	2606	14.736	2607	14.743	2608	14.750	2609	14.756
2610	14.763	2611	14.770	2612	14.777	2613	14.783	2614	14.790	2615	14.797	2616	14.803	2617	14.810	2618	14.817	2619	14.824
2620	14.830	2621	14.837	2622	14.844	2623	14.851	2624	14.857	2625	14.864	2626	14.871	2627	14.877	2628	14.884	2629	14.891
2630	14.898	2631	14.904	2632	14.911	2633	14.918	2634	14.925	2635	14.931	2636	14.938	2637	14.945	2638	14.951	2639	14.958

Type S Thermocouple																				
°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
2640	14.965	2641	14.972	2642	14.978	2643	14.985	2644	14.992	2645	14.998	2646	15.005	2647	15.012	2648	15.019	2649	15.025
2650	15.032	2651	15.039	2652	15.045	2653	15.052	2654	15.059	2655	15.066	2656	15.072	2657	15.079	2658	15.086	2659	15.092
2660	15.099	2661	15.106	2662	15.113	2663	15.119	2664	15.126	2665	15.133	2666	15.139	2667	15.146	2668	15.153	2669	15.160
2670	15.166	2671	15.173	2672	15.180	2673	15.186	2674	15.193	2675	15.200	2676	15.207	2677	15.213	2678	15.220	2679	15.227
2680	15.233	2681	15.240	2682	15.247	2683	15.254	2684	15.260	2685	15.267	2686	15.274	2687	15.280	2688	15.287	2689	15.294
2690	15.300	2691	15.307	2692	15.314	2693	15.321	2694	15.327	2695	15.334	2696	15.341	2697	15.347	2698	15.354	2699	15.361
2700	15.367	2701	15.374	2702	15.381	2703	15.388	2704	15.394	2705	15.401	2706	15.408	2707	15.414	2708	15.421	2709	15.428
2710	15.434	2711	15.441	2712	15.448	2713	15.455	2714	15.461	2715	15.468	2716	15.475	2717	15.481	2718	15.488	2719	15.495
2720	15.501	2721	15.508	2722	15.515	2723	15.521	2724	15.528	2725	15.535	2726	15.542	2727	15.548	2728	15.555	2729	15.562
2730	15.568	2731	15.575	2732	15.582	2733	15.588	2734	15.595	2735	15.602	2736	15.608	2737	15.615	2738	15.622	2739	15.628
2740	15.635	2741	15.642	2742	15.649	2743	15.655	2744	15.662	2745	15.669	2746	15.675	2747	15.682	2748	15.689	2749	15.695
2750	15.702	2751	15.709	2752	15.715	2753	15.722	2754	15.729	2755	15.735	2756	15.742	2757	15.749	2758	15.755	2759	15.762
2760	15.769	2761	15.775	2762	15.782	2763	15.789	2764	15.795	2765	15.802	2766	15.809	2767	15.815	2768	15.822	2769	15.829
2770	15.835	2771	15.842	2772	15.849	2773	15.855	2774	15.862	2775	15.869	2776	15.875	2777	15.882	2778	15.889	2779	15.895
2780	15.902	2781	15.909	2782	15.915	2783	15.922	2784	15.929	2785	15.935	2786	15.942	2787	15.949	2788	15.955	2789	15.962
2790	15.969	2791	15.975	2792	15.982	2793	15.989	2794	15.995	2795	16.002	2796	16.009	2797	16.015	2798	16.022	2799	16.029
2800	16.035	2801	16.042	2802	16.049	2803	16.055	2804	16.062	2805	16.069	2806	16.075	2807	16.082	2808	16.089	2809	16.095
2810	16.102	2811	16.108	2812	16.115	2813	16.122	2814	16.128	2815	16.135	2816	16.142	2817	16.148	2818	16.155	2819	16.162
2820	16.168	2821	16.175	2822	16.182	2823	16.188	2824	16.195	2825	16.202	2826	16.208	2827	16.215	2828	16.221	2829	16.228
2830	16.235	2831	16.241	2832	16.248	2833	16.255	2834	16.261	2835	16.268	2836	16.275	2837	16.281	2838	16.288	2839	16.294
2840	16.301	2841	16.308	2842	16.314	2843	16.321	2844	16.328	2845	16.334	2846	16.341	2847	16.347	2848	16.354	2849	16.361
2850	16.367	2851	16.374	2852	16.381	2853	16.387	2854	16.394	2855	16.400	2856	16.407	2857	16.414	2858	16.420	2859	16.427
2860	16.434	2861	16.440	2862	16.447	2863	16.453	2864	16.460	2865	16.467	2866	16.473	2867	16.480	2868	16.486	2869	16.493
2870	16.500	2871	16.506	2872	16.513	2873	16.520	2874	16.526	2875	16.533	2876	16.539	2877	16.546	2878	16.553	2879	16.559
2880	16.566	2881	16.572	2882	16.579	2883	16.586	2884	16.592	2885	16.599	2886	16.605	2887	16.612	2888	16.619	2889	16.625
2890	16.632	2891	16.638	2892	16.645	2893	16.652	2894	16.658	2895	16.665	2896	16.671	2897	16.678	2898	16.685	2899	16.691
2900	16.698	2901	16.704	2902	16.711	2903	16.718	2904	16.724	2905	16.731	2906	16.737	2907	16.744	2908	16.751	2909	16.757
2910	16.764	2911	16.770	2912	16.777	2913	16.783	2914	16.790	2915	16.797	2916	16.803	2917	16.810	2918	16.816	2919	16.823
2920	16.829	2921	16.836	2922	16.843	2923	16.849	2924	16.856	2925	16.862	2926	16.869	2927	16.876	2928	16.882	2929	16.889
2930	16.895	2931	16.902	2932	16.908	2933	16.915	2934	16.922	2935	16.928	2936	16.935	2937	16.941	2938	16.948	2939	16.954
2940	16.961	2941	16.967	2942	16.974	2943	16.981	2944	16.987	2945	16.994	2946	17.000	2947	17.007	2948	17.013	2949	17.020
2950	17.026	2951	17.033	2952	17.040	2953	17.046	2954	17.053	2955	17.059	2956	17.066	2957	17.072	2958	17.079	2959	17.085
2960	17.092	2961	17.099	2962	17.105	2963	17.112	2964	17.118	2965	17.125	2966	17.131	2967	17.138	2968	17.144	2969	17.151
2970	17.157	2971	17.164	2972	17.171	2973	17.177	2974	17.184	2975	17.190	2976	17.197	2977	17.203	2978	17.210	2979	17.216
2980	17.223	2981	17.229	2982	17.236	2983	17.242	2984	17.249	2985	17.255	2986	17.262	2987	17.268	2988	17.275	2989	17.282
2990	17.288	2991	17.295	2992	17.301	2993	17.308	2994	17.314	2995	17.321	2996	17.327	2997	17.334	2998	17.340	2999	17.347
3000	17.353	3001	17.360	3002	17.366	3003	17.373	3004	17.379	3005	17.386	3006	17.392	3007	17.399	3008	17.405	3009	17.412
3010	17.418	3011	17.425	3012	17.431	3013	17.438	3014	17.444	3015	17.451	3016	17.457	3017	17.464	3018	17.470	3019	17.477
3020	17.483	3021	17.490	3022	17.496	3023	17.503	3024	17.509	3025	17.516	3026	17.522	3027	17.529	3028	17.535	3029	17.542

Type S Thermocouple																				
°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV	°F	mV
3030	17.548	3031	17.555	3032	17.561	3033	17.568	3034	17.574	3035	17.581	3036	17.587	3037	17.594	3038	17.600	3039	17.607
3040	17.613	3041	17.620	3042	17.626	3043	17.633	3044	17.639	3045	17.645	3046	17.652	3047	17.658	3048	17.665	3049	17.671
3050	17.678	3051	17.684	3052	17.691	3053	17.697	3054	17.704	3055	17.710	3056	17.717	3057	17.723	3058	17.729	3059	17.736
3060	17.742	3061	17.749	3062	17.755	3063	17.762	3064	17.768	3065	17.775	3066	17.781	3067	17.787	3068	17.794	3069	17.800
3070	17.807	3071	17.813	3072	17.819	3073	17.826	3074	17.832	3075	17.839	3076	17.845	3077	17.852	3078	17.858	3079	17.864
3080	17.871	3081	17.877	3082	17.884	3083	17.890	3084	17.896	3085	17.903	3086	17.909	3087	17.915	3088	17.922	3089	17.928
3090	17.935	3091	17.941	3092	17.947	3093	17.954	3094	17.960	3095	17.966	3096	17.973	3097	17.979	3098	17.985	3099	17.992
3100	17.998	3101	18.004	3102	18.011	3103	18.017	3104	18.023	3105	18.030	3106	18.036	3107	18.042	3108	18.049	3109	18.055
3110	18.061	3111	18.068	3112	18.074	3113	18.080	3114	18.086	3115	18.093	3116	18.099	3117	18.105	3118	18.112	3119	18.118
3120	18.124	3121	18.130	3122	18.137	3123	18.143	3124	18.149	3125	18.155	3126	18.162	3127	18.168	3128	18.174	3129	18.180
3130	18.187	3131	18.193	3132	18.199	3133	18.205	3134	18.211	3135	18.218	3136	18.224	3137	18.230	3138	18.236	3139	18.242
3140	18.248	3141	18.255	3142	18.261	3143	18.267	3144	18.273	3145	18.279	3146	18.285	3147	18.292	3148	18.298	3149	18.304
3150	18.310	3151	18.316	3152	18.322	3153	18.328	3154	18.334	3155	18.341	3156	18.347	3157	18.353	3158	18.359	3159	18.365
3160	18.371	3161	18.377	3162	18.383	3163	18.389	3164	18.395	3165	18.401	3166	18.407	3167	18.413	3168	18.419	3169	18.425
3170	18.431	3171	18.437	3172	18.443	3173	18.449	3174	18.455	3175	18.461	3176	18.467	3177	18.473	3178	18.479	3179	18.485
3180	18.491	3181	18.497	3182	18.503	3183	18.509	3184	18.515	3185	18.521	3186	18.527	3187	18.533	3188	18.539	3189	18.545
3190	18.551	3191	18.557	3192	18.562	3193	18.568	3194	18.574	3195	18.580	3196	18.586	3197	18.592	3198	18.598	3199	18.603
3200	18.609	3201	18.615	3202	18.621	3203	18.627	3204	18.633	3205	18.638	3206	18.644	3207	18.650	3208	18.656	3209	18.661
3210	18.667																		