ASVIN THERMOCOUPLE with THERMOWELL

FOR PROCESS INDUSTRIES

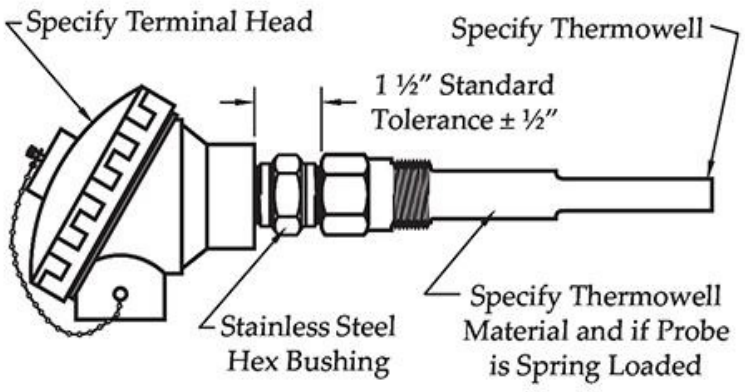
ASIAN INDUSTRIAL VALVES AND INSTRUMENTS MAKE ASVIN Thermowell serves as a protective barrier between a thermometer and the process media. ASVIN Thermowells are often found in industrial process systems within refineries and petrochemical and chemical plants.

ASVIN Thermocouple is a temperature measuring device that is exposed to a process in order to determine its temperature. Thermowell is a structure that surrounds the Thermocouple (or RTD) probe and protects it from aspects of the process such as fluid flow rates or caustic or degrading materials.

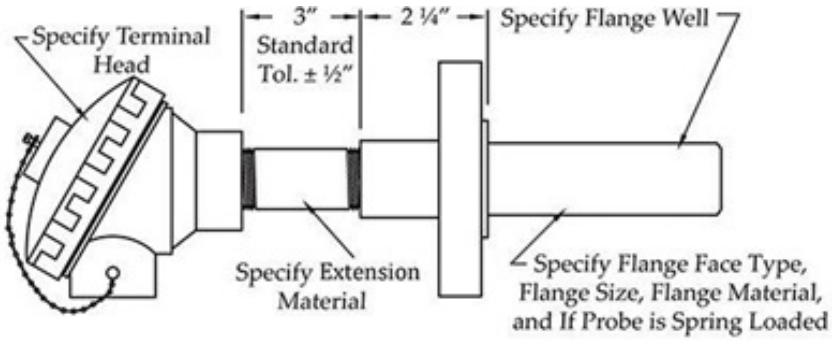
ASVIN Thermowell assemblies are manufactured from drilled bar stock and have threaded NPT process connections or flanges for direct immersion into high pressure or corrosive applications. ASVIN Thermocouple element is mounted into the Thermowell and is positive contact with the bottom wall of the well to allow response to temperature changes during operation.

Aluminium cover heads are used to terminate the ASVIN Thermowell assemblies. ASVIN Thermocouple element are constructed of ceramic insulated thermocouple wires or mineral insulated cable for increased durability. ASVIN Thermowell itself are machined in a variety of designs and insertion lengths. Most ASVIN Thermowells are manufactured of 304 stainless steel or 316 stainless steel, however other alloys are available. Various well materials and terminal heads are available as options. ASVIN Thermowells are supplied with thick wall base metal materials and construction for corrosive, high velocity, and high pressure.

ASVIN Thermocouple with Threaded Thermowell



ASVIN Thermocouple with Flange Thermowell



Type J is also very common. It has a smaller temperature range and a shorter lifespan at higher temperatures than the Type K. It is equivalent to the Type K in terms of expense and reliability.

Type J Temperature Range:

- Thermocouple grade wire, -346 to 1,400F (-210 to 760C)
- Extension wire, 32 to 392F (0 to 200C)

Type J Accuracy (whichever is greater):

- Standard: +/- 2.2C or +/- .75%
- Special Limits of Error: +/- 1.1C or 0.4%

Type T (Copper/Constantan) is a very stable thermocouple and is often used in extremely low temperature applications such as cryogenics or ultra-low freezers. It is found in other laboratory environments as well. The type T has excellent repeatability between –380F to 392F (–200C to 200C).

Type T Temperature Range:

- Thermocouple grade wire, -454 to 700F (-270 to 370C)
- Extension wire, 32 to 392F (0 to 200C)

Type T Accuracy (whichever is greater):

- Standard: +/- 1.0C or +/- .75%
- Special Limits of Error: +/- 0.5C or 0.4%

Type N (Nicrosil / Nisil) shares the same accuracy and temperature limits as the Type K. The type N is slightly more expensive. The type N has better repeatability between 572F to 932F (300C to 500C) compared to the type K.

Type N Temperature Range:

- Maximum continuous operating temperature: up to 2,300F (1,260C)
- Short term use: 2,336F (1,280C)
- Thermocouple grade wire, -454 to 2300F (-270 to 1,260C)
- Extension wire, 32 to 392F (0 to 200C)

Type E (Nickel-Chromium/Constantan) has a stronger signal & higher accuracy than the Type K or Type J at moderate temperature ranges of 1,000F and lower. The type E is also more stable than the type K, which adds to its accuracy.
Type E Temperature Range:

- Thermocouple grade wire, -454 to 1600F (-270 to 870C)
- Extension wire, 32 to 392F (0 to 200C)

Type E Accuracy (whichever is greater):

- Standard: +/- 1.7C or +/- 0.5%
- Special Limits of Error: +/- 1.0C or 0.4%

Type B (Platinum Rhodium – 30% / Platinum Rhodium – 6%) thermocouple is used in extremely high temperature applications. It has the highest temperature limit of all of the thermocouples listed above. It maintains a high level of accuracy and stability at very high temperatures. The type B has a lower output than the other noble metals (type R & type S) at temperatures below 1,112F (600C).

Type B Temperature Range:

- Thermocouple grade wire, 32 to 3100F (0 to 1700C)
- Extension wire, 32 to 212F (0 to 100C)

Accuracy (whichever is greater):

- Standard: +/- 0.5%
- Special Limits of Error: +/- 0.25%

Type R (Platinum Rhodium -13% / Platinum) is used in very high temperature applications. It has a higher percentage of Rhodium than the Type S, which makes it more expensive. The Type R is very similar to the Type S in terms of performance. It is sometimes used in lower temperature applications because of its high accuracy and stability. Type R has a slightly higher output and improved stability over the type S.

Type R Temperature Range:

- Thermocouple grade wire, -58 to 2700F (-50 to 1480C)
- Extension wire, 32 to 392F (0 to 200C)

Accuracy (whichever is greater):

- Standard: +/- 1.5C or +/- .25%
- Special Limits of Error: +/- 0.6C or 0.1%

Type S (Platinum Rhodium - 10% / Platinum) is used in very high temperature applications. It is commonly found in the BioTech and Pharmaceutical industries. It is sometimes used in lower temperature applications because of its high accuracy and stability. The type S is often used with a ceramic protection tube.

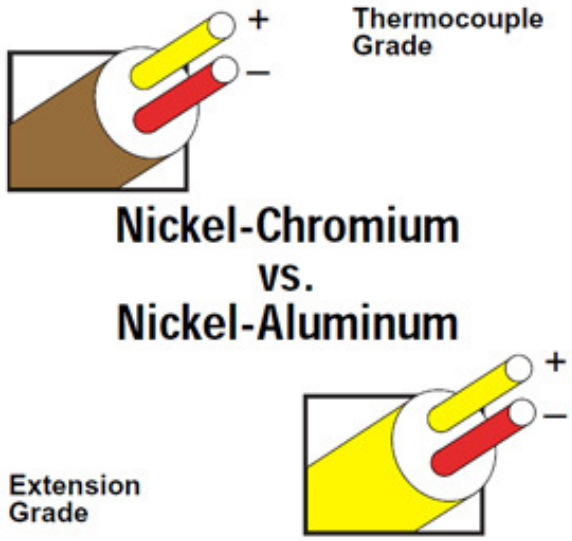
Type S Temperature Range:

- Maximum continuous operating temperature: up to 2,912F (1600C)
- Short term use: up to 3,092F (1,700C)
- Thermocouple grade wire, -58 to 2700F (-50 to 1480C)
- Extension wire, 32 to 392F (0 to 200C)

Accuracy (whichever is greater):

- Standard: +/- 1.5C or +/- .25%
- Special Limits of Error: +/- 0.6C or 0.1%

Type K Thermocouple (Nickel-Chromium / Nickel- Alumel): Type K thermocouples usually work in most applications as they are nickel based and exhibit good corrosion resistance. It is the most common sensor calibration type providing the widest operating temperature range. Due to its reliability and accuracy the Type K thermocouple is used extensively at temperatures up to 2300°F (1260°C). This type of thermocouple should be protected with a suitable metal or ceramic protection tube, especially in reducing atmospheres. In oxidizing atmospheres, such as electric furnaces, tube protection is not always necessary when other conditions are suitable; however, it is recommended for cleanliness and general mechanical protection. Type K will generally outlast Type J because the JP wire rapidly oxidizes, especially at higher temperatures.



Type K thermocouples are used for measurements in many different types of environments such as water, mild chemical solutions , gases and dry areas. Engines, oil heaters and boilers are examples of places where they may be found. They are used as thermometers in hospitals and the food industry.

Temperature Range:

•Thermocouple grade wire, –454° to 2,300°F (–270 to 1,260°C)

•Extension grade wire, –32° to 392°F (0 to 200°C)

•Melting Point, 2550°F (1400°C)

Accuracy (whichever is greater):

•Standard: ± 2.2C% or ±.75%

•Special Limits of Error: ± 1.1C or 0.4%

Deviations in the alloys can affect the accuracy of thermocouples. For type K thermocouples the tolerance class one is given as ± 1.5 K between -40 and 375 °C. However, deviations between thermocouples coming from the same production are very small and a much higher accuracy can be achieved by individual calibration.

Metallurgical changes can cause a calibration drift of 1 to 2°C in a few hours, increasing to 5 °C over time. A special grade of Type K is available that can maintain special limit accuracy up to ten times longer than the regular grade.

TOLERANCE OF THERMOCOUPLES

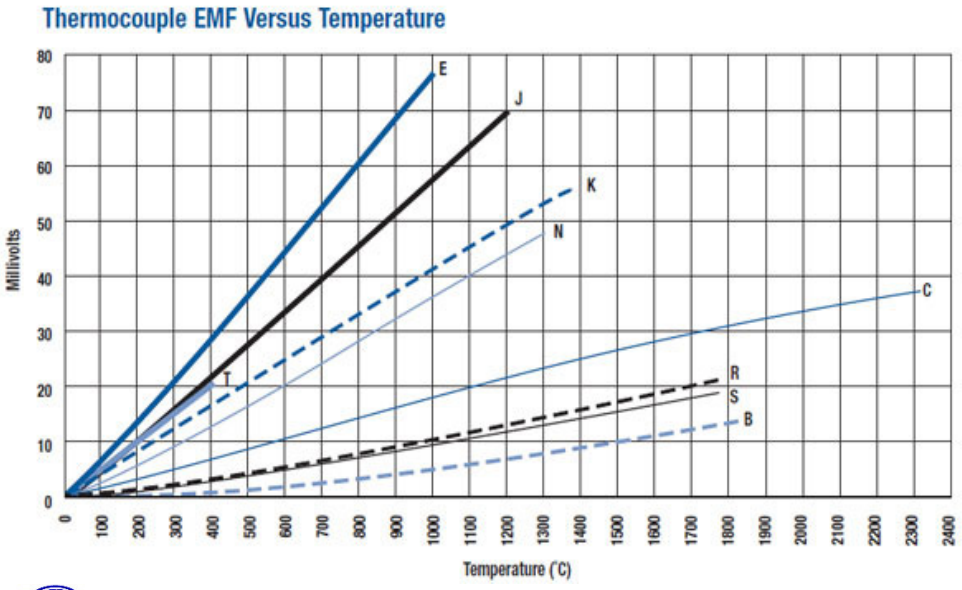
ANSI/ASTM	°C			°F		
	Temperature Range	Standard	Special	Temperature Range	Standard	Special
T	-200° to -67° -67° to -62° -62° to 125° 125° to 133° 133° to 370°	± 1.5% T ± 1° ± 1° ± 1° ± 0.75% T	± 0.8% T* ± 0.8% T* ± 0.5° ± 0.4% T ± 0.4% T	-328° to -88° -88° to -80° -80° to 257° 257° to 272° 272° to 700°	± 1.5% (T – 32) ± 1.8° ± 1.8° ± 1.8° ± 0.75% (T – 32)	± 0.8% (T – 32)* ± 0.8% (T – 32)* ± 0.9° * ± 0.4% (T – 32) ± 0.4% (T – 32)
J	0° to 275° 275° to 293° 293° to 760°	± 2.2° ± 2.2° ± 0.75% T	± 1.1° ± 0.4% T ± 0.4% T	32° to 527° 527° to 560° 560° to 1400°	± 3.96° ± 3.96° ± 0.75% (T – 32)	± 1.98° ± 0.4% (T – 32) ± 0.4% (T – 32)
E	-200° to -170° -170° to 250° 250° to 340° 340° to 870°	± 1% T ± 1.7° ± 1.7° ± 0.5% T	± 1°* ± 1°* ± 0.4% T ± 0.4% T	-328° to -274° -274° to 482° 482° to 644° 644° to 1600°	± 1% (T – 32) ± 3.06° ± 3.06° ± 0.5% (T – 32)	± 1.8°* ± 1.8°* ± 0.4% (T – 32) ± 0.4% (T – 32)
K	-200° to -110° -100° to 0° 0° to 275° 275° to 293° 293° to 1260°	± 2% T ± 2.2° ± 2.2° ± 2.2° ± 0.75% T	— — ± 1.1° ± 0.4% T ± 0.4% T	-328° to -166° -166° to 32° 32° to 527° 527° to 560° 560° to 2300°	± 2% (T – 32) ± 3.96° ± 3.96° ± 3.96° ± 0.75% (T – 32)	— — ± 1.98° ± 0.4% (T – 32) ± 0.4% (T – 32)
N	0° to 275° 275° to 293° 293° to 1250°	± 2.2° ± 2.2° ± 0.75% T	± 1.1° ± 0.4% T ± 0.4% T	32° to 527° 527° to 560° 560° to 2300°	± 3.96° ± 3.96° ± 0.75% (T – 32)	± 1.98° ± 0.4% (T – 32) ± 0.4% (T – 32)
R or S	0° to 1260° 1260° to 1480°	± 1.5° ± 0.25% T	± 0.6° ± 0.1% T	32° to 1112° 1112° to 2700°	± 2.7° ± 0.25% (T – 32)	± 1.08° ± 0.1% (T – 32)
B	870° to 1700°	± 0.5% T	± 0.25%	1600° to 3100°	± 0.5% (T – 32)	± 0.25% (T – 32)
C**	0° to 426° 426° to 2315°	± 4.4° ± 1% T	— —	32° to 800° 800° to 4200°	± 8° ± 1% (T – 32)	— —

Thermocouple conductors come in a variety of sizes. Depending on your application, the gauge selected will affect the thermocouple's performance. The larger the gauge size, the more thermal mass the thermocouple will have with a corresponding decrease in response. The larger the gauge size the greater the stability and operating life. Conversely, a smaller gauge size will have a quicker response, but may not deliver the stability or operating life required.

Thermocouple Type	No. 8 Gauge °F (°C)	No. 14 Gauge °F (°C)	No. 20 Gauge °F (°C)	No. 24 Gauge °F (°C)	No. 28 Gauge °F (°C)
E	1600 (870)	1200 (650)	1000 (540)	800 (430)	800 (430)
J	1400 (760)	1100 (590)	900 (480)	700 (370)	700 (370)
K and N	2300 (1260)	2000 (1190)	1800 (980)	1600 (870)	1600 (870)
R and S				2700 (1480)	
T		700 (370)	500 (260)	400 (200)	400 (200)

CALIBRATION

- Calibration according to International Standards (ANSI , IEC, etc.)



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