

# STT 3000 Series STT800 Temperature Probe Assemblies Specifications

Models STT820, STT830, STT840

34-TT-03-08 March 2012



## Overview

Honeywell's STT 3000 family of microprocessor based smart temperature transmitters includes STT 170, STT250, STT350 and STT800 series of products. While the STT 170, STT250 and STT350 are standalone temperature transmitters, STT800 series are integrated probe assemblies based on variety of temperature elements; thermowells; connection heads and terminal blocks for connection to remote mounted transmitters.

Choose the unit to meet your application needs:

- **STT820:** Rigid Probe assembly without thermowell
- **STT830:** Threaded and socket weld assembly with thermowell and extension
- **STT840:** Drilled Flanged assembly with thermowell and extension.

## Description

The STT800 series integrated temperature probe assemblies cater to tough industrial applications and are available with variety of process connection options. The integrated temperature probe assemblies are ready for installation when they are calibrated and shipped from the factory. They can be ordered with variety of RTD and Thermocouple elements and wells.

## Features

- Ready to install temperature point resulting in lower engineering, procurement, installation and commissioning cost
- Choice of STT 3000 temperature transmitters with connection head, extension, sensor and thermowell are available with easy to order model number
- Custom calibration for transmitter and element
- Probe with transmitter calibration option
- Variety of communication protocols Analog, DE, HART, FF

## Specifications of Connection Heads:

Connection Heads are part of the STT 800 integrated temperature probe assemblies meant for housing the sensor terminals and/or transmitters. STT 800 integrated temperature probe assemblies are available with both head mounted and field mounted housings.



Series STT830 Assembly – Typical



Series STT840 Assembly – Typical

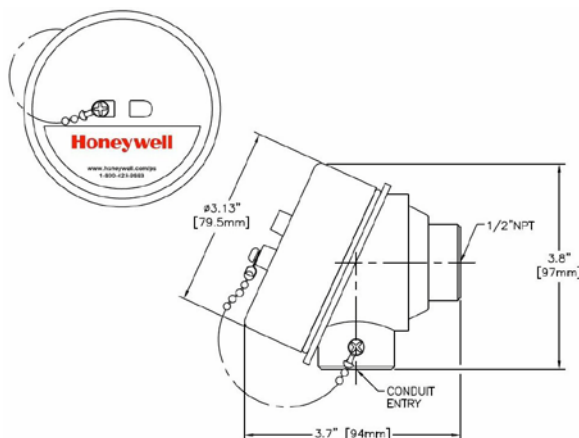


Series STT820 Assembly - Typical

## Housings

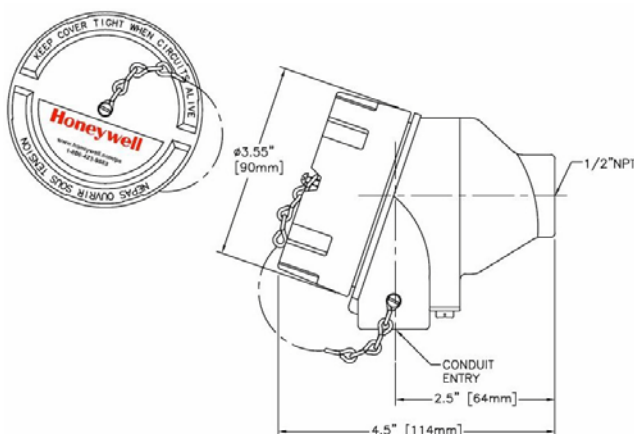
### General Purpose Aluminum Housings:

- Dimensions according to DIN form B
- Protection grade: **IP66 (NEMA-4)**
- Max. temperature: **121° C (250° F)**
- Material: **aluminum**
- Conduit Entry: **½" NPT or ¾" NPT or M20 x 1.5**
- Thermowell Entry: **½" NPT**
- Body Color: **Gray**
- Cap Color: **Gray**
- Weight: **.8lbs (360g)**
- Captive Chain: **Stainless Steel Ball Type**



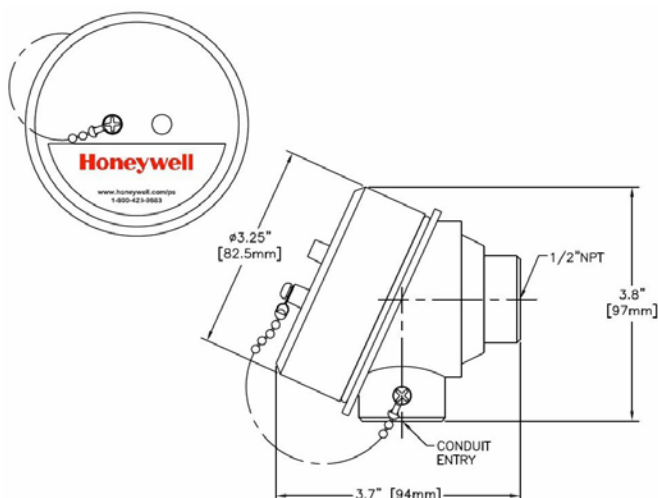
### Explosion Proof Aluminum Housings:

- Dimensions according to DIN form B
- Protection grade: **IP66 (NEMA-4)**
- Class 1 Div 1, **Groups B, C & D**
- Class 2, Div. 1 **Groups E, F & G**
- Max. temperature: **121° C (250° F)**
- Material: **aluminum**
- Conduit Entry: **½" NPT, ¾" NPT or M20 x 1.5**
- Thermowell Entry: **½" NPT**
- Body Color: **Gray**
- Cap Color: **Gray**
- Weight: **.8lbs (360g)**
- Captive Chain: **Stainless Steel Ball Type**



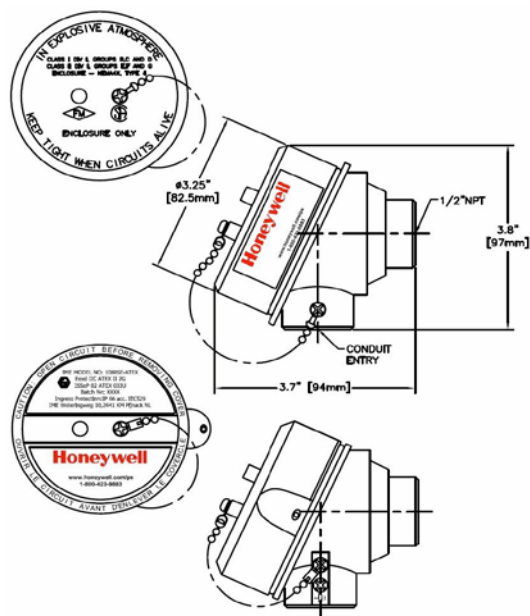
### General Purpose Stainless Steel Housings:

- Dimensions according to DIN form B
- Protection grade: **IP66 (NEMA-4, -4X)**
- Max. temperature: **121° C (250° F)**
- Material: **316 Stainless Steel**
- Conduit Entry: **½" NPT, ¾" NPT or M20 x 1.5**
- Thermowell Entry: **½" NPT**
- Body Finish: **Electro Polish**
- Cap Finish: **Electro Polish**
- Weight: **1.8Lbs (800g)**
- Captive Chain: **Stainless Steel Ball Type**

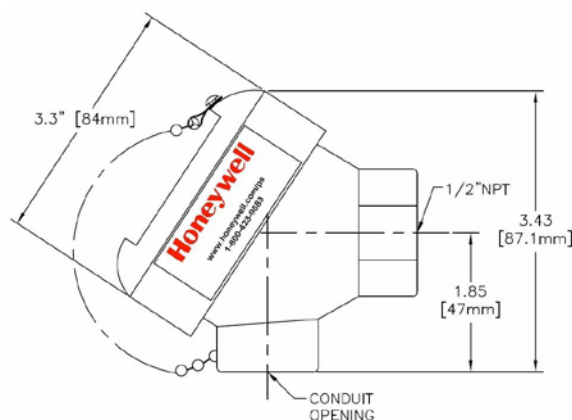


**Explosion Proof Stainless Steel Housings:**

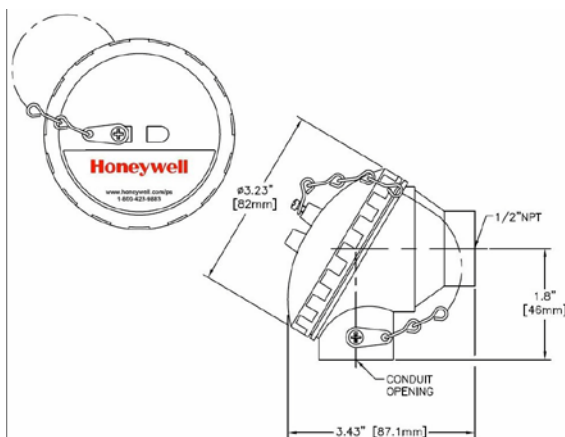
- Dimensions according to DIN form B
- Protection grade: **IP66 (NEMA-4, -4X)**
- Class 1 Div 1, **Groups B, C & D**
- Class 2, Div. 1 **Groups E, F & G**
- Max. temperature: **121° C (250°F)**
- Material: **316 Stainless Steel**
- Conduit Entry: **1/2" NPT, 3/4" NPT or M20 x 1.5**
- Thermowell Entry: **1/2" NPT**
- Body Finish: **Electro Polish**
- Cap Finish: **Electro Polish**
- Weight: **1.8Lbs (800g)**
- Captive Chain: **Stainless Steel Ball Type**

**General Purpose Cast Iron Housings:**

- Dimensions according to DIN form B
- Protection grade: **IP68 (NEMA-4, -4X)**
- Max. temperature: **121° C (250°F)**
- Material: **Cast Iron**
- Conduit Entry: **1/2" NPT, 3/4" NPT or M20 x 1.5**
- Thermowell Entry: **1/2" NPT**
- Body Finish: **Cast Iron with a High Temperature Black Paint**
- Cap Finish: **Cast Iron with a High Temperature Black Paint**
- Weight: **2Lbs (900g)**
- Captive Chain: **Stainless Steel Ball Type**

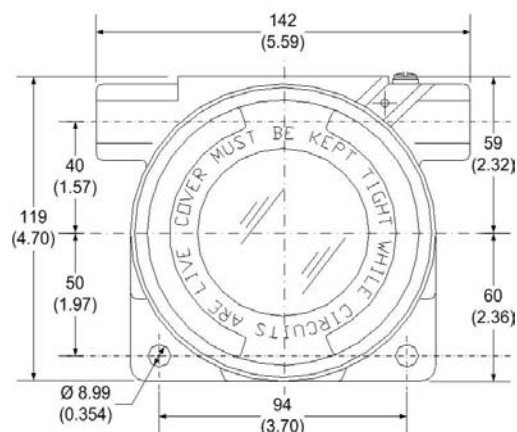
**General Purpose Polypropylene Housings:**

- Dimensions according to DIN form B
- Protection grade: **FDA Approved Polypropylene**
- Max. temperature: **92° C (198°F)**
- Material: **White Polypropylene**
- Conduit Entry: **1/2" NPT, 3/4" NPT or M20 x 1.5**
- Thermowell Entry: **1/2" NPT**
- Weight : **6oz (170g)**
- Captive Chain: **Stainless Steel Link Type**



**Explosion Proof Aluminum & Stainless Steel housing EPE / STE:**

- Protection grade: **IP66/67 (NEMA-4, -4X)**
- Class 1 Div 1, **Groups B, C & D**
- Class 2, Div. 1 **Groups E, F & G**
- Max. temperature: **121° C (250°F)**
- Material: **Aluminum Alloy 360 / 316 Stainless Steel**
- Conduit Entry: **½” NPT**
- Thermowell Entry: **½” NPT**
- Aluminum Body Finish: **Beige Epoxy**
- Aluminum Cap Finish: **Beige Epoxy**
- Weight: **3.05 Lbs (1.38 kg)**



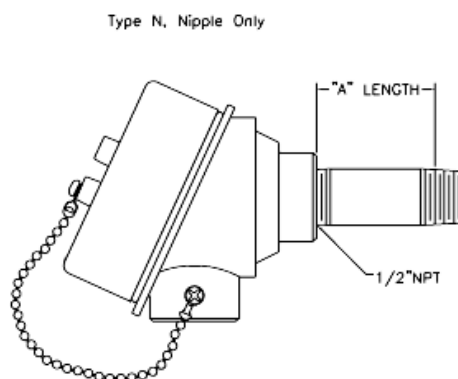
## Extension

To complete the connection between the thermowell and the head a nipple or nipple / union / nipple combination is used. The most economical would be a pipe nipple. A nipple / union / nipple combination allows for rotating the connection head 360°. Hex nipples provide for wrench adjustment. Extensions are available in carbon steel or stainless steel for corrosion protection. Extension lengths can be 1, 2, 5, 7 or 9" with the longer lengths to extend the head beyond insulation or firebrick.

### Extension Specifications:

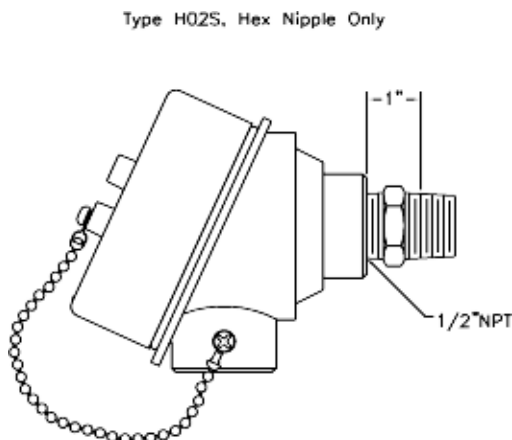
### Nipple Extension Only

- Most economical
- Provides for minimal space between head and thermowell
- Nipple size: ½”NPT by Schedule 40
- Available materials: Carbon Steel or 304 Grade Stainless Steel
- Standard “A” Length: 2” and 5”
- Available in longer lengths, 316 Stainless Steel and/or Schedule 80



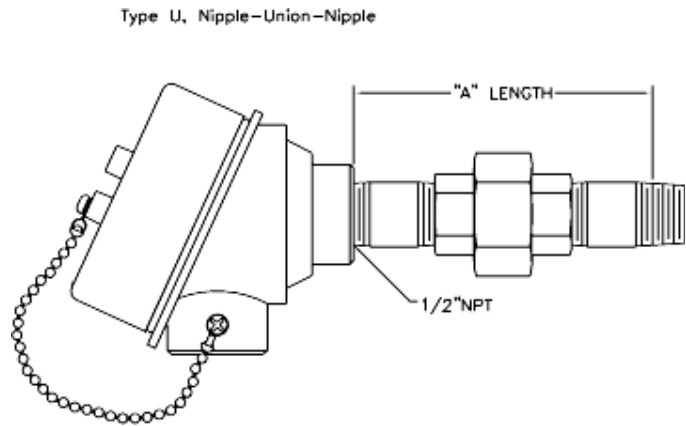
## Hex Nipple Extension

- Machined from solid bar stock
- Best suited for wiring the transmitter
- Hex allows for easy dis-assembly
- Standard "A" length of 1"
- Standard 316 Grade Stainless Steel



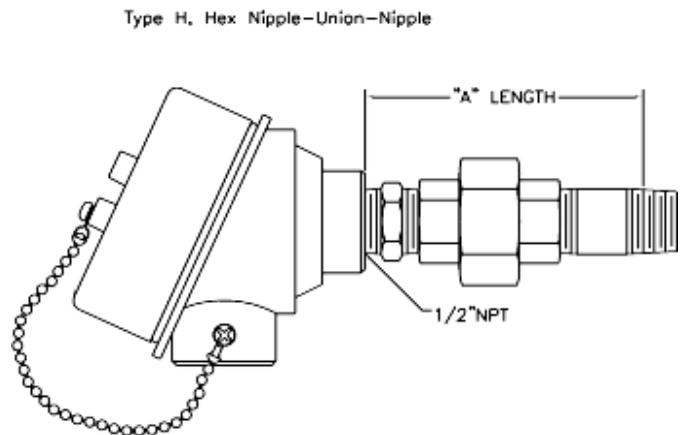
### Nipple/Union/Nipple Extension

- Union provides the means for positioning for conduit cable connection
- Nipple size:  $\frac{1}{2}$ "NPT by Schedule 40
- Union size:  $\frac{1}{2}$ "NPT by 150#
- Available nipple materials: Carbon Steel or 304 Grade Stainless Steel
- Available union materials: Galvanized Steel or 304 Grade Stainless Steel
- Standard "A" Length: 5", 7" and 9"
- Available in other lengths, 316 Stainless Steel or Schedule 80 nipples and 3000# rated unions



### Hex Nipple/Union/Nipple Extension

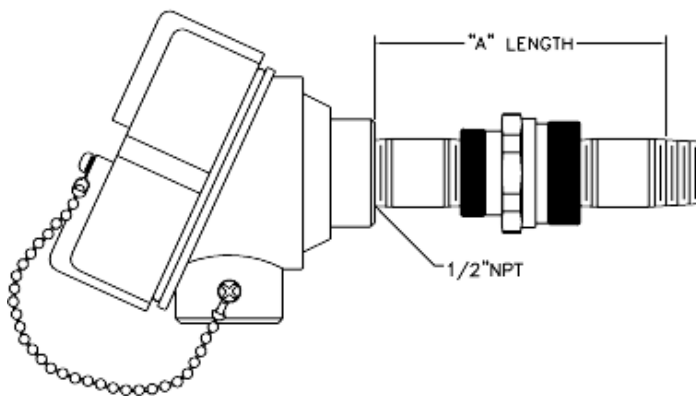
- Union provides the means for positioning for conduit cable connection
- Best suited for wiring the transmitter
- Hex nipple provide for additional wrench tightening
- Union provides the means for positioning for conduit cable connection
- Nipple size:  $\frac{1}{2}$ "NPT by Schedule 40
- Union size:  $\frac{1}{2}$ "NPT by 150#
- Hex nipple: 316 Grade Stainless Steel
- Available nipple materials: Carbon Steel or 304 Grade Stainless Steel
- Available union materials: Galvanized Steel or 304 Grade Stainless Steel
- Standard "A" Length: 5", 7" and 9"
- Available in other lengths, 316 Stainless Steel or Schedule 80 nipples and 3000# rated unions



**Nipple/Explosion Proof Union/Nipple Extension**

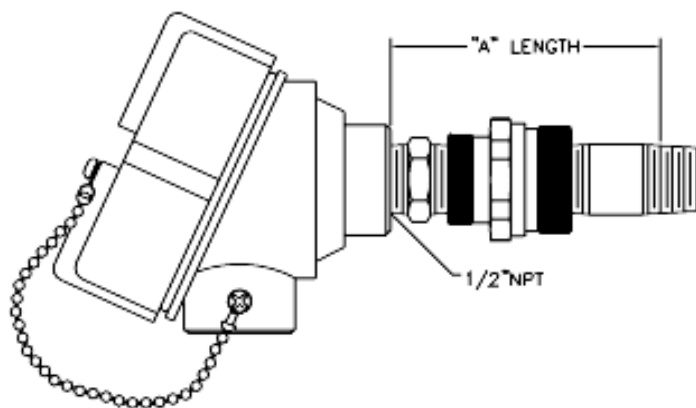
- Same benefits as the standard Nipple/Union/Nipple extension except with explosion proof union rated:
  - Class 1, Division 1 and 2, Groups A, B, C and D
  - Class 2, Division 1 and 2, Groups E, F and G
  - Class 3
  - Recommended when supplied with explosion proof connection heads.

Type E, Nipple-Explosion Proof Union-Nipple

**Hex Nipple/Explosion Proof Union/Nipple Extension**

- Same benefits as the standard Hex Nipple/Union/Nipple extension except with explosion proof union rated:
  - Class 1, Division 1 and 2, Groups A, B, C and D
  - Class 2, Division 1 and 2, Groups E, F and G
  - Class 3
  - Recommended when supplied with explosion proof connection heads.

Type X, Hex Nipple-Explosion Proof Union-Nipple



### Thermowells:

Thermowells are generally incorporated into the process three ways, threaded, welded or a flanged connection. For smaller diameters where the well is not required to be removed on a regular basis and corrosion is not a serious problem, threaded process connections are preferred. By threading into a coupling, thread-o-let or TEE, the well has attached directly to the vessel or run pipe.

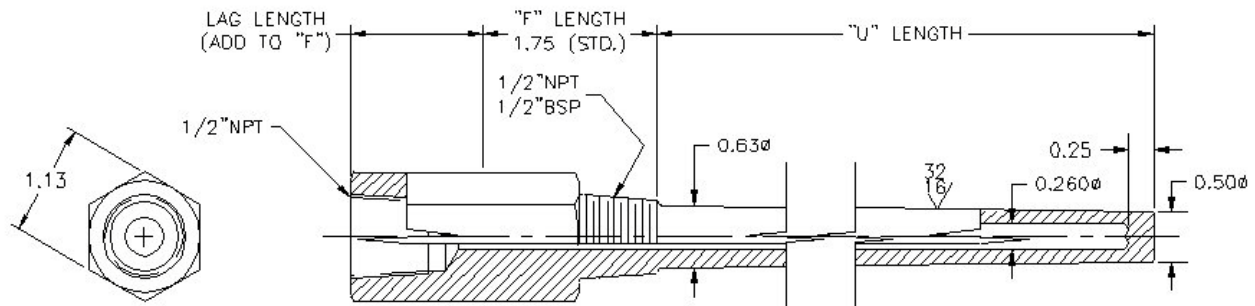
For installations where the well needs to be removed more frequently due to corrosion or other requirements, a flange connection is used. The flange connection will bolt to a mating flange mounted to the process. Flange connections are more appropriate for high-pressure applications and larger pipe sizes.

For applications where access is not required, a socket well can be used; these provide a high quality connection and cannot be removed without significant effort. Welded connections are also preferred for high pressure, high temperature steam lines.

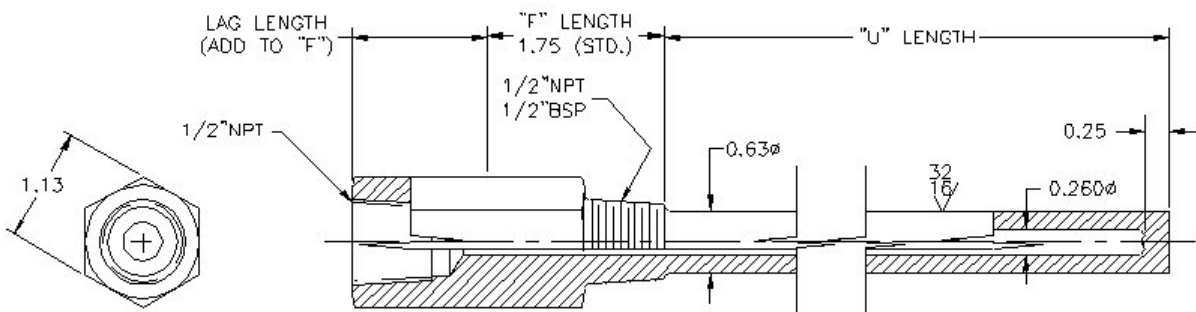
### Threaded and Socket thermowells

- Selection A (1/2"NPT Process Connection)
- Selection B (1/2"BSP Process Connection)

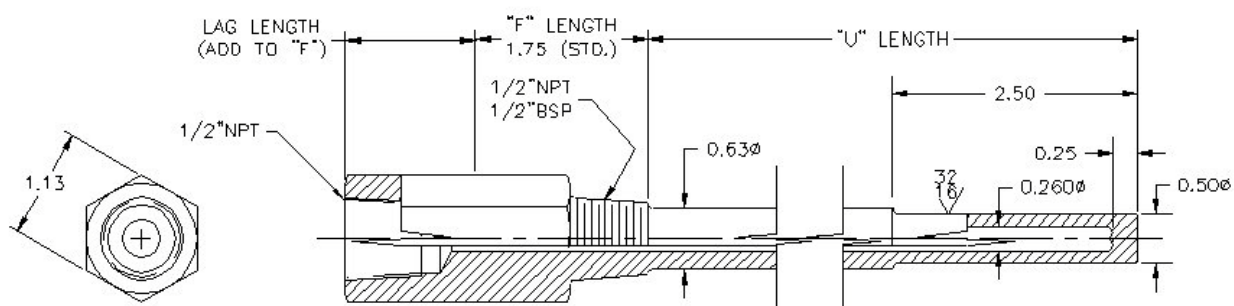
### T Tapered Design



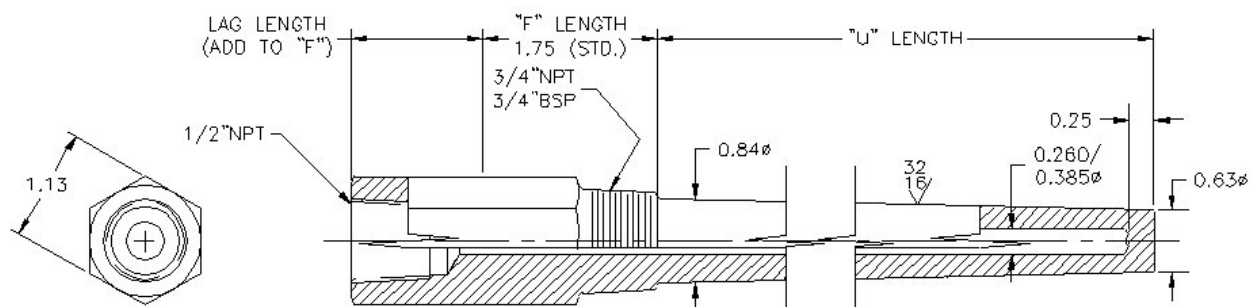
### S Straight Design



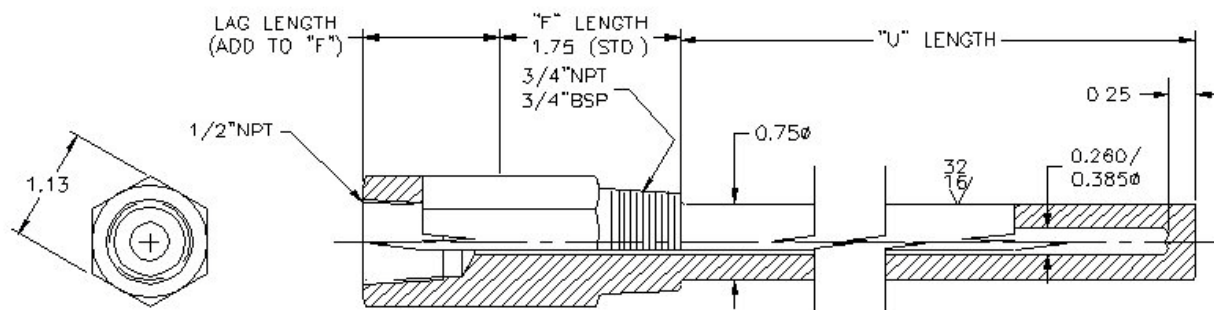
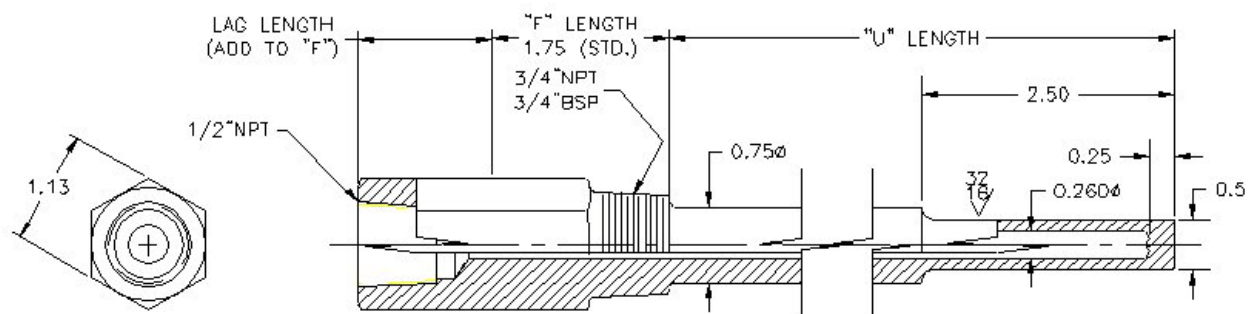


**P Stepped Design**

- Selection C (3/4"NPT Process Connection, .260 $\phi$  Bore)
- Selection D (3/4"NPT Process Connection, .385 $\phi$  Bore)
- Selection E (3/4"BSP Process Connection, .260 $\phi$  Bore)
- Selection F (3/4"BSP Process Connection, .385 $\phi$  Bore)

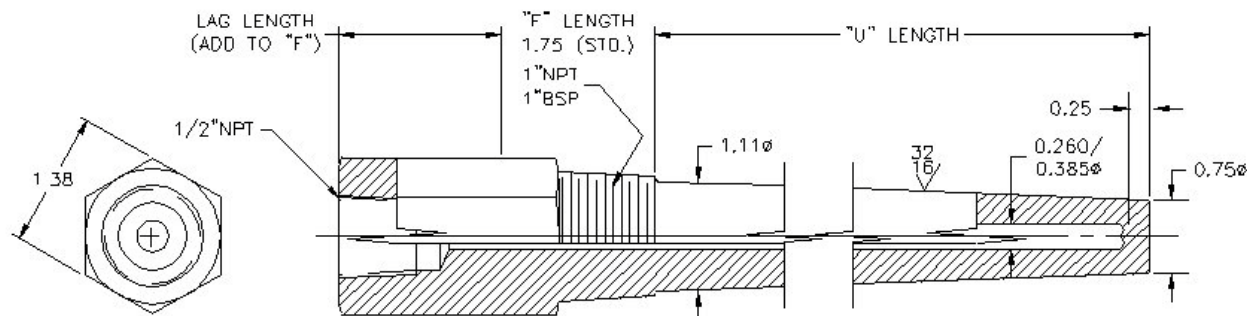
**T Tapered Design**



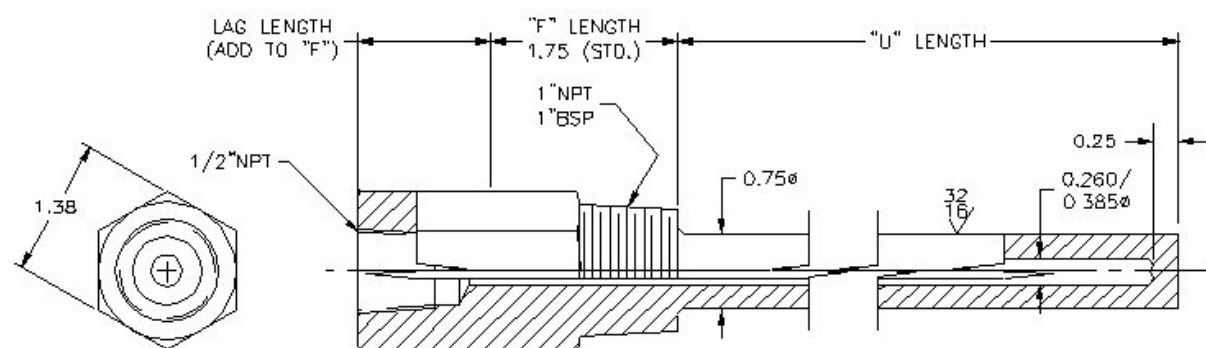
**S Straight Design****P Stepped Design**

- Selection G (1"NPT Process Connection, .260ø Bore)
- Selection H (1"NPT Process Connection, .385ø Bore)
- Selection J (1"BSP Process Connection, .260ø Bore)
- Selection K (1"BSP Process Connection, .385ø Bore)

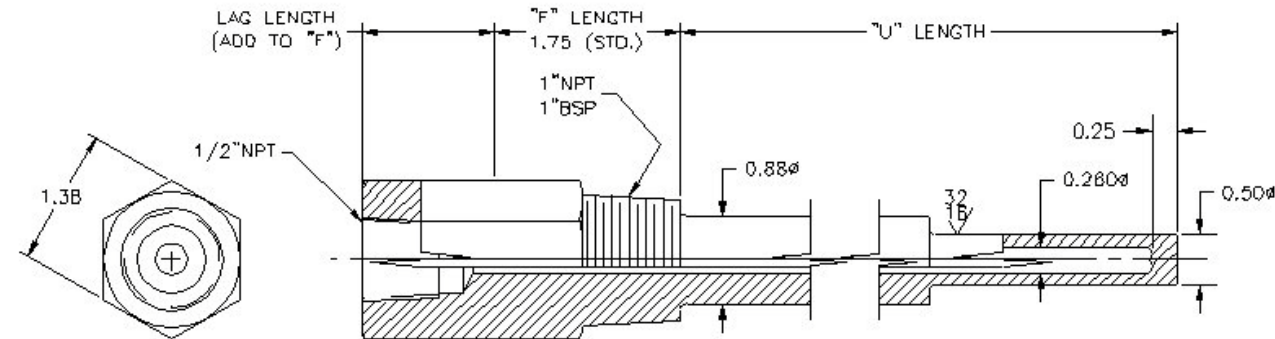
T Tapered Design



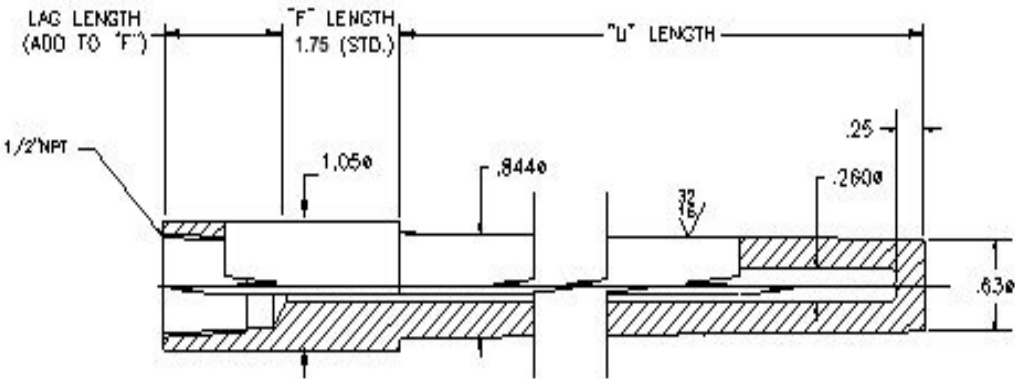
S Straight Design



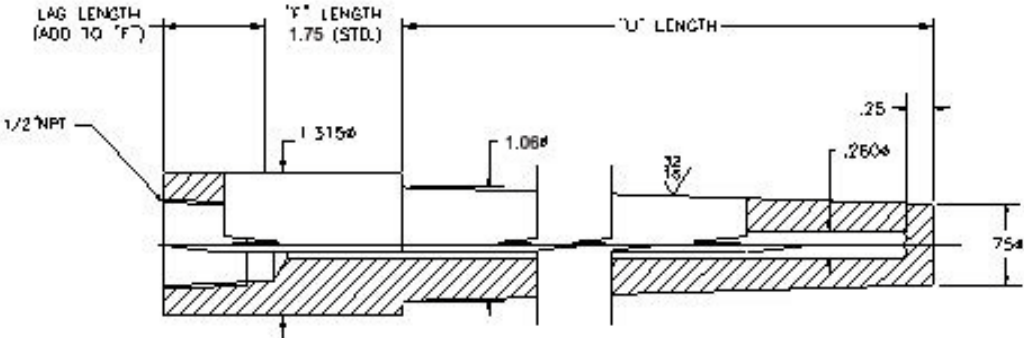
P Stepped Design



- Selection M (3/4"NPS Socket Weld Process Connection)

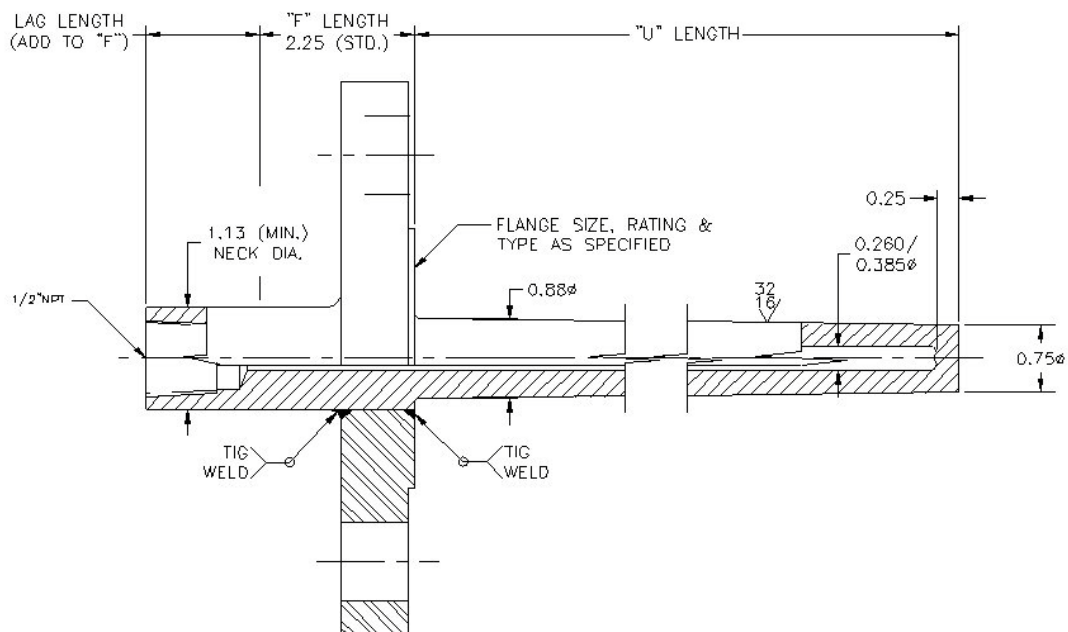


- Selection N (1"NPS Socket Weld Process Connection)

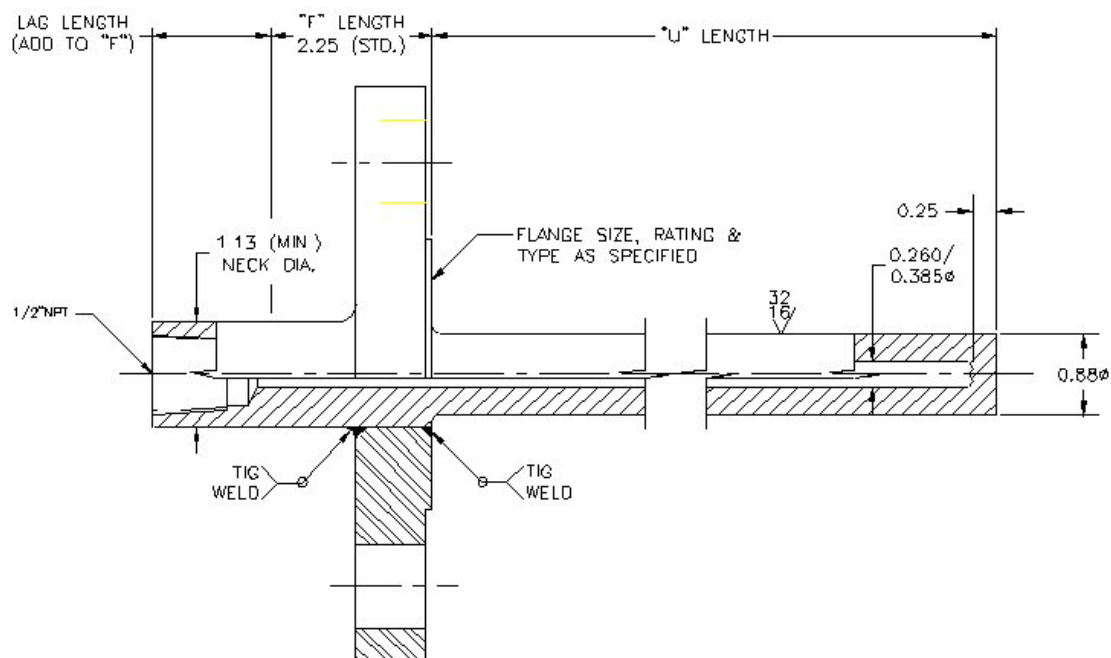


**Flanged Thermowells:**

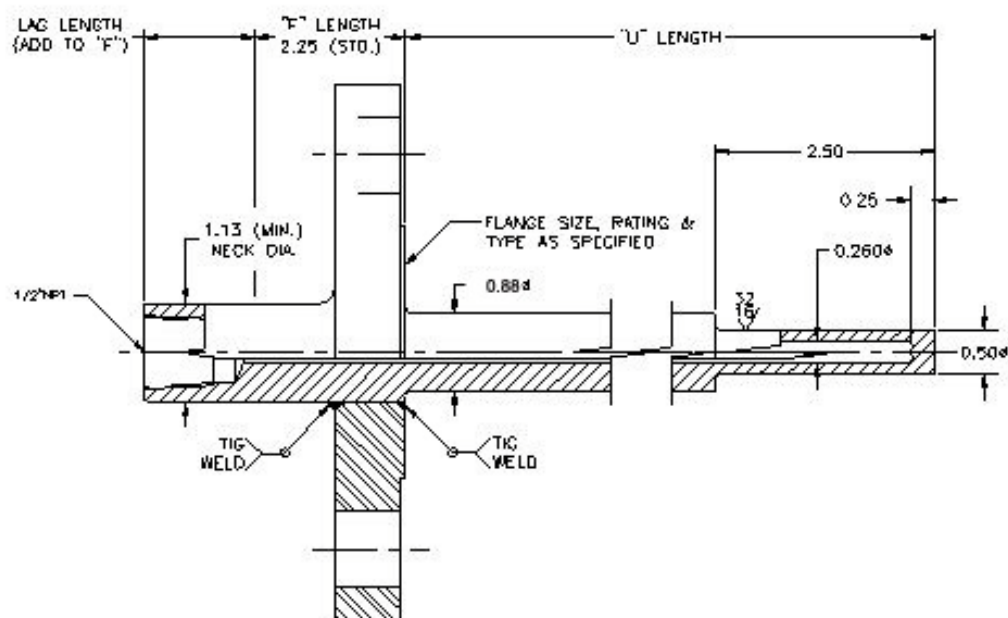
- Selection A (.260Ø Bore, Tapered Design)
- Selection B (.385Ø Bore Tapered Design)



- Selection C (.260Ø Bore, Straight Design)
- Selection D (.385Ø Bore Straight Design)



- Selection E (.260Ø Bore, Stepped Design)



## **Assembly Options**

### **Selection PTI & PT2, Hydrostatic Testing (PT1 only on Socket wells)**

Hydrostatic testing is a diagnostic technique to check for leaks or defects by means of slowly increasing water pressure in a line or chamber to a pre-determined setting. A visual inspection is performed to determine if any leakage exists or if the pressure set point reduces. Thermowells are mostly internally pressure tested, flanged and threaded thermowells may be externally tested. Testing pressure is recommended at the process maximum pressure or at 1.5 times the pressure rating in accordance with ANSI B16.5.

### **Selection FPW, Full Penetration Weld (Flanged Thermowells)**

The most secure method of connecting the flange to the well is with a full penetration weld. In this, the flange is over bored to allow the well material to make full contact for the entire length of the connection. With a full penetration welded connection, the integrity of the connection is excellent. While this is much more costly in initial procurement cost, it can save significant long-term cost in the life and performance of the thermowell. Again, proper welding procedures are critical.

### **Selection HT1, NACE Certificate**

Certification of material to the maximum hardness guidelines for sour service is found in NACE MR0175.

### **Selection XGN Oxygen Cleaning in accordance with ASTM G 93 - 96**

Adequate contamination control in oxygen systems is imperative to minimize hazards and component failures because of contamination. This method of cleaning for service in oxygen environments eliminates contamination problems encountered in the use of enriched air, mixtures of oxygen with other gases, or any other oxidizing gas that may be solved by the same cleaning procedures. This is applicable to metallic materials thereby preventing ignition by a variety of mechanisms such as particle impact, mechanical or pneumatic impact.

### **Selection CLN Chlorine Cleaning in accordance with ASTM G 93 - 96**

To assure that dry chlorine systems have protection from the intrusion of moisture the Chlorine Institute, Inc. has provided pamphlets to support the chlor-alkali industry and serve the public with human health and environmental protection in the distribution and use of chlorine.

### **Selection FRQ Frequency Calculation**

Thermowells must be carefully selected for processes where significant velocity is present. By penetrating the process flow, the thermowell is subject to the stress and friction of the flow. This may set up a natural vibration in the well. If this is not done correctly, the vibration will be such that the well will shear off in the process. This can be especially troublesome in high velocity steam lines. As the engineer needs to have the well deep enough into the process to accurately measure the temperature, the selection of the length and diameter of the well needs to be checked against the process to ensure that they are compatible. This is done through a calculation known as a Murdock. This calculation will determine whether a thermowell will be acceptable for the proposed process. The Von Karman Trail refers to the turbulent wake, which is formed as fluid flows past the thermowell. A vibration frequency is determined by the diameter of the thermowell and the fluid velocity. Should this frequency equal the natural frequency of the thermowell it will cause the thermowell to vibrate to the point where it will break off? Therefore, it is important that the thermowell is designed to insure the natural frequency of the thermowell always exceeds the potential wake frequency.

**Selection TMC Thermowell Material Certificate**

The bar stock and flange supplier certifications are traceable to the lot, batch, or heat number lot in accordance with the applicable specification. A Mill Test Report or MTR is documentation that shows the chemical makeup and physical strength/properties of materials (bar stock, flanges) used in fabrication of thermowells required to meet ASME and ASTM grades. The MTR shows the percentage of alloy used through chemical analysis and mechanical tests of a sample piece to represent the whole batch of a run of material. The MTR proves that the material received meets the grade required. The company that does the testing from the mill itself issues this or by an outside company who tests for the mill. The MTR's include approval as define in EN 10204 3.1B assuring the manufacturer's authorized representation is independent of manufacturing.

**Selection AP2, AP3 & AP4 Probe Calibration Data Certificate**

Probe calibration provided at two, three or four temperature points. A comparison method to NIST standard PRT (Primary Reference Thermometer) is used. This allows for maintaining a calibration uncertainty of as low as .03° C. Calibration testing is available at any temperature between -35° C and 1250° C as well as cryogenic temperature of -195.6° C. Detailed calibration report is submitted with shipment showing test results. Temperature points are required at time of order.

**Selection SP1 & SP2 Upgrade to Special Limits (Thermocouples)**

For improved probe accuracy of approximately ½ the calibration error of the standard, we select and check calibration that are set factory temperature points. Recommend when using options AP2, AP3 & AP4.

**Selection CL1 & CL2 Upgrade to Grade A (RTD's)**

Platinum RTD's typically are provided in grades (or class) or tolerance. Grade A has an ice point tolerance of  $\pm 0.06\%$  at ice point and grade B  $\pm 0.12\%$  at ice point. The ASTM standard is slightly better than the DIN at  $\pm 0.05\%$  and  $\pm 0.10\%$ . Recommend when using options AP2, AP3 & AP4.

**Selection TC1 & TC2 Transmitter with Probe System Calibration**

All temperature sensors (thermocouple or RTD) have inherent errors. A properly designed, manufactured and calibrated Class A RTD probe has an allowable error of 0.13 °C at ice point, at 500 °C the max. allowable error is 0.98 °C (per ASTM E1137-5). If a transmitter is calibrated using a calibration standard with a typical accuracy of .01 to .02 °C and then attached to an RTD probe, the error of that RTD probe is transferred directly to the transmitter output. From the start, you may see an error of close to 1 °C at the higher temperatures.

Using our system calibration, the transmitter is calibrated at the customers selected zero and span points using the actual sensor as the input rather than a standard. This means the transmitter calibration eliminates the probes inherent error. This allows the system accuracy to exceed from what it would normally achieve when calibrating the probe and transmitter separately.

Platinum RTD's typically are provided in grades (or class) or tolerance. Grade A has an ice point tolerance of  $\pm 0.06\%$  at ice point and grade B  $\pm 0.12\%$  at ice point. The ASTM standard is slightly better, in this application, than the DIN at  $\pm 0.05\%$  and  $\pm 0.10\%$ . Recommend when using options AP2, AP3 & AP4.

**Selection CRN Canadian Register Number**

The Canadian Registration Number (CRN) is a number issued by each province or territory of Canada to the design of a boiler, pressure vessel or fitting. Fitting being the thermowell has been accepted and registered for use in that province or territory. Numeric digits following the decimal point within the CRN represent the province or territory.



## Sensors

Thermocouple and RTD's (Resistance Temperature Detectors) are the most common temperature sensors employed by the process manufacturers.

**Resistance Temperature Detector (RTD)** elements are normally constructed of platinum, copper, nickel or nickel/iron. They operate as a positive temperature coefficient device when an excitation voltage is applied to convert changes in temperature to voltage signals by the measurement of resistance. The metals have the properties necessary for use in RTD elements due to their resistance to temperature characteristics that increase in resistance as temperature increases and, conversely, decrease in resistance as temperature decreases. These metals are best suited for RTD applications because of their linear resistance-temperature characteristics, their high coefficient of resistance, and their ability to withstand repeated temperature cycles. The change in electrical resistance to temperature for a material is termed the "temperature coefficient of resistance".

**Wire wound design** uses helical coil of very small platinum sensing wire of known alpha value. This coil is then slid into a ceramic insulator. Larger extension leads are spot welded to the ends of the platinum wire and cemented in place. Another construction is an outer winding of the platinum wire around a center mandrel, usually made of ceramic. This winding is coated with glass as a means of securing the windings. Wire wound elements are available in a number of materials and suitable for a wider temperature range.

**Thin film sensing elements** are manufactured with a thin layer of platinum deposited on to a ceramic substrate. The platinum film is laser cut or chemical etched to achieve the desired resistance path. The element is then coated with a thin layer of glass for protection. Lead wires are welded to the platinum with epoxy applied to hold the lead wires in place. Thin film elements are lower in cost than wire wound and faster in response time. RTD's are available in two, three and four wire configuration. Selection of the lead wire configuration is usually based on the instrumentation, desired accuracy and stability.

**Two wire RTD:** One lead wire is attached to each side of the element. This is the least accurate due to the inability to compensate for lead length resistance.

**Three wire RTD:** This is the most commonly used configuration. By adding a third lead to one end of the sensing element instrumentation can detect and compensate for lead resistance.

**Four wire RTD:** four wires provide for the most accurate method of RTD measurement. A constant current is carried through two leads with the remaining two used to measure the voltage drop.

**Duplex RTD:** RTD's are available in duplex construction in any of the wire configurations. With wire wound bulbs, two sets of windings are used. In thin film, two elements are set in place side-by-side. The second element may be used as a spare, testing purposes or connection to a second instrument.

## R - Low Temperature

Low temperature is recommended for uses up to -58 to +500°F.

The Standard RTD employs a thin film element. The element is calibrated to ASTM E1137 Grade B. Internal lead wires are nickel clad copper, insulated with Teflon. Film elements are sometimes better suited for high vibration applications.

## H – High Temperature

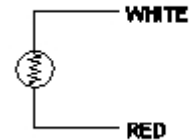
High temperature is recommended for uses up to -292 to +932°F.

It is made utilizing MgO insulated, metal sheathed cable. Internal lead wires are made from nickel-plated copper wires. This provides the minimum lead wire resistance change with temperature. H type RTD's employ a Ceramic wire wound element

RTD's are considered ungrounded.

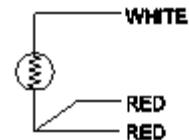
- **Type R1 or H1**

- Construction: Single, 2-wire
- Resistance @ 0°C: 100 OHMS
- Temperature Coefficient of Resistance: .00385
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"



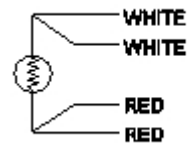
- **Type R2 or H2**

- Construction: Single, 3-wire
- Resistance @ 0°C: 100 OHMS
- Temperature Coefficient of Resistance: .00385
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"



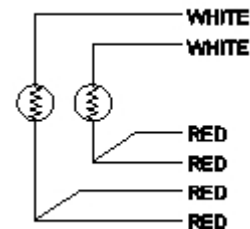
- **Type R3 or H3**

- Construction: Single, 4-wire
- Resistance @ 0°C: 100 OHMS
- Temperature Coefficient of Resistance: .00385
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"



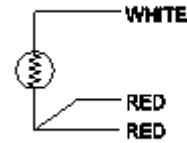
- **Type R4 or H4**

- Construction: Duplex, 3-wire
- Resistance @ 0°C: 100 OHMS
- Temperature Coefficient of Resistance: .00385
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"



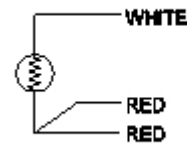
- **Type R5 or H5**

- Construction: Single, 3-wire
- Resistance @ 0°C: 200 OHMS
- Temperature Coefficient of Resistance: .00385
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"



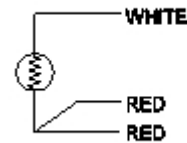
- **Type R6 or H6**

- Construction: Single, 3-wire
- Resistance @ 0°C: 500 OHMS
- Temperature Coefficient of Resistance: .00385
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"



- **Type R7 or H7**

- Construction: Single, 3-wire
- Resistance @ 0°C: 1000 OHMS
- Temperature Coefficient of Resistance: .00385
- Insulation Teflon(FEP)
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"

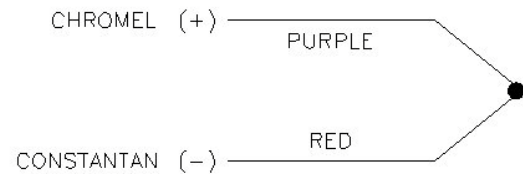


Lead Wire provides for termination from the sheath solid wire to flexible lead wire with Teflon insulation. Lead wires are attached by soldering and the area is sealed with epoxy to provide a durable moisture seal. Lead wires terminate to bare ends for connection to terminal block or transmitters.

## Thermocouples

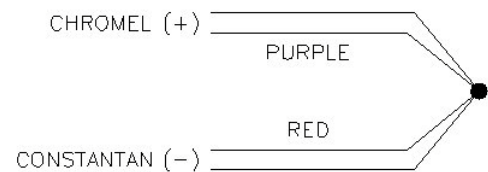
### • Type T1

- Construction: Single
- Calibration: Type E, Chromel – Constantan
- Conductor Size: 18 Ga.
- Insulation: Hard Packed MgO
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"
- Recommended Temperature Range: -328 to +1600° F



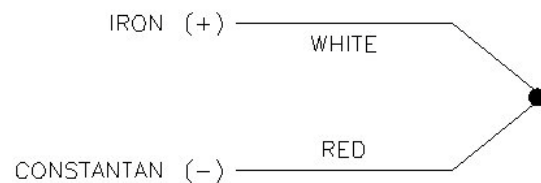
### • Type T2

- Construction: Duplex
- Calibration: Type E, Chromel – Constantan
- Conductor Size: 18 Ga.
- Insulation: Hard Packed MgO
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"
- Recommended Temperature Range: -328 to +1600° F



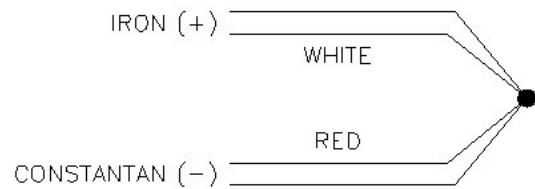
### • Type T3

- Construction: Single
- Calibration: Type J, Iron - Constantan
- Conductor Size: 18 Ga.
- Insulation: Hard Packed MgO
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"
- Recommended Temperature Range: -32 to +1400° F



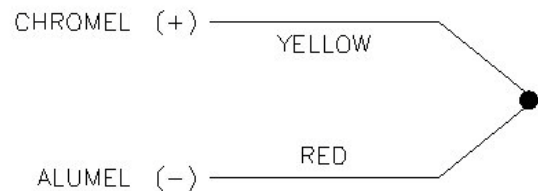
- **Type T4**

- Construction: Duplex
- Calibration: Type J, Iron - Constantan
- Conductor Size: 18 Ga.
- Insulation: Hard Packed MgO
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"
- Recommended Temperature Range: -32 to +1400° F



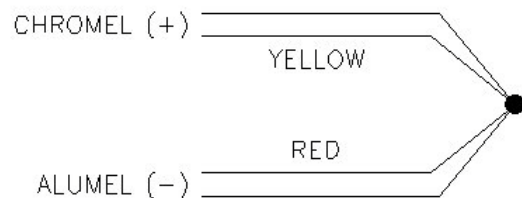
- **Type T5**

- Construction: Single
- Calibration: Type K, Chromel - Alumel
- Conductor Size: 18 Ga.
- Insulation: Hard Packed MgO
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"
- Recommended Temperature Range: -328 to +2300° F



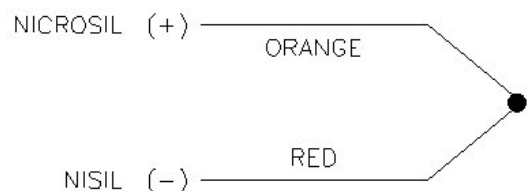
- **Type T6**

- Construction: Duplex
- Calibration: Type K, Chromel - Alumel
- Conductor Size: 18 Ga.
- Insulation: Hard Packed MgO
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"
- Recommended Temperature Range: -328 to +2300° F



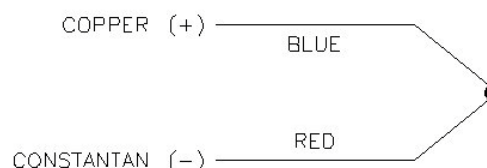
- **Type T7**

- Construction: Single
- Calibration: Type N, Nicrosil - Nisil
- Conductor Size: 18 Ga.
- Insulation: Hard Packed MgO
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"
- Recommended Temperature Range: -328 to +2300° F



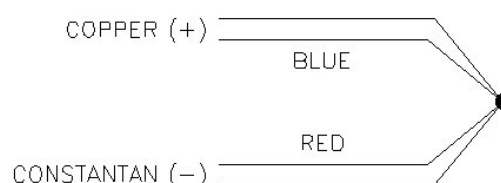
- **Type T1**

- Construction: Single
- Calibration: Type T, Copper – Constantan
- Conductor Size: 18 Ga.
- Insulation: Hard Packed MgO
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"
- Recommended Temperature Range: -328 to +700° F



- **Type T2**

- Construction: Duplex
- Calibration: Type T, Copper – Constantan
- Conductor Size: 18 Ga.
- Insulation: Hard Packed MgO
- Sheath Material: 316 Stainless Steel
- Sheath Diameter: ¼"
- Recommended Temperature Range: -328 to +700° F



**Type E:** CHROMEL (+) vs Constantan (-) has the highest EMF output of any standardized metallic thermocouple. If used unprotected, Type E wires are NOT subject to corrosion at sub-zero temperatures. They can be used in inert, oxidizing or reducing atmospheres. Because they cover a wide range with a single calibration curve, Type E thermocouples are preferred for computer applications.

**Type J:** Iron (+) vs Constantan (-), is the most commonly used calibration. It is suitable for use in a vacuum, inert, oxidizing (with the iron leg protected) or reducing atmosphere. If unprotected the iron wire may be attacked by ammonia, nitrogen and hydrogen atmospheres. In sub zero temperatures the iron wire may rust or become brittle. Type J should not be used in sulfurous atmospheres above 540°C.

**Type K:** Chromel (+) vs Alumel (-) is generally used to measure high temperatures up to 2300°F. It should not be used for accurate temperature measurement below 900°F or after prolonged exposure above 1400°F. If unprotected, it can be used only in inert or oxidizing atmospheres. It has a short life in alternately oxidizing and reducing atmospheres and in reducing atmospheres, particularly in the 1500 to 1850°F range.

**Type N:** Nicrosil (+) vs Nisil(-), was developed for oxidation resistance and EMF stability superior to those of Type K thermocouples at elevated temperatures. These couples have shown to have a longer life, than Type K thermocouples, in both laboratories and industrial applications

**Type T:** Copper (+) vs. Constantan (-), is commonly used for sub-zero to 700°F temperature. It is preferred to Type J for sub-zero applications because of copper's higher moisture resistance as compared to iron. If unprotected, it will still function in a vacuum, inert, oxidizing or reducing atmosphere.

### Grounded Measuring Junction - G

In this construction, the measuring junction is completely sealed from contaminants and becomes an integral part of sheath at the tip of the thermocouple. Response time approaches that of an exposed loop thermocouple and in addition, the junction conductors are completely protected in a pressure tight seal protecting it from harsh environmental conditions and mechanical damage. Grounded junctions should not be used when ground loops or other electrical interference is likely.

Dual grounded junction thermocouples furnish two measuring circuits for simultaneous control and indication (or recording) of a single point with two instruments. Thus preventing the signal loading effect common to instrumentation of low or combination low and high impedance.



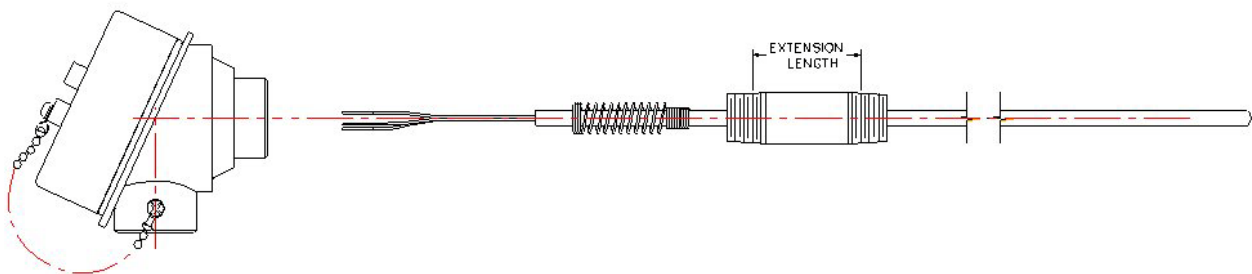
### Ungrounded Measuring Junction - U

In this construction, the thermocouple conductors are welded together to form the junction, which is insulated from the external sheath with magnesium oxide. The response time for an insulated junction is slightly longer than for a grounded junction thermocouple of the same outside diameter. This feature is advantageous in applications where thermocouples are used in conductive solutions, or when used for differential, averaging (parallel) or additive (series) applications, or wherever isolation of the measuring circuitry is required. The strain due to differential expansion between wires and sheath may be reduced.



Same as the single ungrounded junction the dual ungrounded junction thermocouples furnish two measuring circuits for simultaneous control and indication (or recording) of a single point with two instruments. Thus preventing the signal loading effect is common to instrumentation of low or combination low and high impedance.

Lead Wire provides for termination from the sheath solid wire to flexible lead wire with PVC insulation. Lead wires are attached by welding or soldering and the area is then sealed with epoxy to provide a durable moisture seal. Thermocouple lead wires utilize the same alloys as the thermocouple calibration. Lead wires terminate to bare ends for connection to terminal block or transmitters.





## Integral Meters

Honeywell's Series STT800 integrated temperature probe assemblies can be supplied with local or remote indication as an option. An Analogue,

Engineering Units or a Smart meter can be mounted integral to the transmitter inside the field mount housing. Order an integral meter as part of the model number; Table II \_\_ M, \_\_ E and \_\_ S, respectively. Order a remote meter as model RMA300. The analogue meter is a 4-20mA moving coil type and displays the temperature in 0 to 100% span.

The E. U. meter displays temperature in engineering units with the STT25H, STT25T and STT25S HART units. Refer to 34-ST-25-08D for more details. The Smart meter accepts 4-20mA or DE protocol and displays temperature on a LCD in engineering units or 0 to 100% span.

The remote digital meter reads DE protocol and displays temperature on a LCD in 0 to 100% span. Refer to 34-ST-25

07A for details. Smart Meter and Fieldbus Meter are available with STT350 and STT35F Respectively in the field mounted housing.

EU meter is available with STT170 transmitters in field-mounted housings.

## Certifications

STT820 probe and STT830 / STT840 thermowell assemblies with a terminal block, or model STT170, STT250, STT350, or STT35F temperature transmitters installed.

NOTICE: The temperature probe and head-mount housings are supplied and certified by Thermo Electric Company, Inc., 1193 McDermott Drive, West Chester, PA 19380. Honeywell International Inc. supplies the temperature transmitter module.

### CSA Certification

Class I, Division 1, Group B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1; Ex d, IIC, T6;

RTD and TC assemblies, Series CH, OS, LT and SF: rated 24Vdc, 30 mA (when used with terminal block, otherwise rating dependent on transmitter head used), MWP of 0, 70 and 1500 psi. (Dependent on seal fitting assembly and/or thermowell used). Maximum operating ambient 85°C. Enclosure type 4X and Ingress protection IP66 (only when Thermowell assembly is used with equally rated CSA rated enclosure.)

### Ex d, IIC, T6;

RTD and TC assemblies, Series CF; rated 24Vdc, 30 mA (when used with terminal block, otherwise rating dependent on transmitter head used), MWP of 1500 psi. (When thermowell used). The maximum operating ambient 85°C. Enclosure Type 4X and Ingress protection IP66 (only when thermowell assembly is used with equally rated CSA rated enclosure.)

### FM Approval (U.S.A.)

Series CH, SF & LT Thermocouple/RTD Sensor Assembly

Class I, Division 1, Group A\*, B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1, T\*\*; Type 4/4X, IP66\*\*\*

Class I, Zone 1 IIC; T\*\*; Type 4/4X\*\*\*, IP66\*\*\*\*

Series OS Thermocouple/RTD Sensor Assembly

Class I, Division 1, Group B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1, T\*\*; Type 4/4X \*\*\*

Class I, Zone 1 IIB+H<sub>2</sub>; T\*\*; Type 4/4X\*\*\*

Special Conditions of Use;

\* Enclosures supplied with a window are de-rated to Class I and II, Gas Groups B, C, & D and IIB + H<sub>2</sub>.

\*\* Temperature Class (T-Codes)

DB Electronics Option:

T6 Ta = -50°C to +80°C

DT Electronics Option; actual T-Code dependent upon specific electronics.

T6 Ta = -40°C to +45°C or Ta = -40°C to +60°C

T5 Ta = -40°C to +60°C or Ta = -40°C to +65°C

T4 Ta = -40°C to +85°C or Ta = -50°C to +60°C

T3 Ta = -40°C to +85°C or Ta = -40°C to +60°C

\*\*\* Type 4X, rating dependent upon enclosure, nipple extension and thermowell material.

\*\*\*\*IP66 dependent upon enclosure, thermowell required.

See FM Approvals Certificate of Compliance for complete listings.

### **ATEX Certification**

STT820 – Rigid Probe Assembly – Explosionproof / Flameproof Installation Conditions

LCIE 05 ATEX 6105 X – Flameproof EEx d IIC T\*; IP6X\*\* T85°C

Ambient Limits: -20°C to +80°C

ATEX Special Conditions for Safe Use: The caloric transfer of the sensor probe shall not transmit in any application where heating is above +80°C or cooling below -20°C, including ambient temperature to all sensor parts directly in contact with the explosive atmosphere.

STT830 – Threaded & Socket Weld Thermowell & Probe Assembly – Explosionproof / Flameproof Installation Conditions

CSA 238296-1896285 – Explosionproof / Flameproof: Class I, Division 1 or 2, Groups B, C & D; Class II, Division 1 or 2, Groups E, F & G; Class III, Division 1, T\*; Class I, Ex d IIC, T\*; Enclosure rating\*\*

Ambient Limits: (See selected transmitter specification)

CSA Conditions: Threaded & Socket Weld Thermowell & Probe Assembly Maximum Working Pressure (MWP) = 1,500 psi (103 bar)

LCIE 05 ATEX 6105 X – Flameproof EEx d IIC T\*; IP6X\*\* T85°C

Ambient Limits: (See selected transmitter specification)

STT840 – Flanged Thermowell & Probe Assembly – Explosionproof / Flameproof Installation Conditions

CSA 238296-1896285 – Explosionproof / Flameproof: Class I, Division 1 or 2, Groups B, C & D; Class II, Division 1 or 2, Groups E, F & G; Class III, Division 1, T\*; Class I, Ex d IIC, T\*; Enclosure rating\*\*

Ambient Limits: (See selected transmitter specification)

CSA Conditions – Flanged Thermowell and Probe Assembly: Maximum Working Pressure (MWP) = flange rating based on material and process temperature, but shall not to exceed 1,500 psi (103 bar).

LCIE 05 ATEX 6105 X – Flameproof EEx d IIC T\*; IP6X\*\* T85°C

Ambient Limits: (See selected transmitter specification)

\* The T-Code is T6 when supplied only with a terminal block. For the T-Code with the temperature transmitter installed, refer to the transmitter Model Selection Guide (MSG) or transmitter specification.

\*\* Refer to the head-mount enclosure supplied to determine the environmental “Type” or “IP” rating.

The range of thermowells available as a total thermal solution covers almost every possible requirement:

STT820 Series	34-44-16-08	Rigid Probe Assemblies.
STT830 Series	34-44-16-09	Threaded and Socket Weld Thermowell Assemblies.
STT840 Series	34-44-16-10	Drilled Flanged Thermowell Assemblies.

For the detailed specifications of Honeywell STT 3000 range of temperature transmitters, refer to

34-TT-03-07	STT170	Specification
EN01 – 6031	STT250	Specifications of STT25M, STT25D, STT25H, and STT25S Smart temperature transmitters
EN01 – 6091	STT250	Specifications of STT25T Dual Input Smart temperature transmitters
EN01 – 6083	STT35F	Specification
EN01 – 5222	STT350	Specification

## Ordering information

## Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

### ASIA PACIFIC

(TAC)

[hfs-tac-support@honeywell.com](mailto:hfs-tac-support@honeywell.com)

#### Australia

Honeywell Limited  
Phone: +(61) 7-3846 1255  
FAX: +(61) 7-3840 6481  
Toll Free 1300-36-39-36  
Toll Free Fax:  
1300-36-04-70

#### China – PRC - Shanghai

Honeywell China Inc.  
Phone: (86-21) 5257-4568  
Fax: (86-21) 6237-2826

#### Singapore

Honeywell Pte Ltd.  
Phone: +(65) 6580 3278  
Fax: +(65) 6445-3033

#### South Korea

Honeywell Korea Co Ltd  
Phone: +(822) 799 6114  
Fax: +(822) 792 9015

### EMEA

Honeywell Process Solutions,  
Phone: + 80012026455 or +44  
(0)1202645583  
FAX: +44 (0) 1344 655554

Email: (Sales)

[sc-cp-apps-salespa62@honeywell.com](mailto:sc-cp-apps-salespa62@honeywell.com)

or

(TAC)

[hfs-tac-support@honeywell.com](mailto:hfs-tac-support@honeywell.com)

### NORTH AMERICA

Honeywell Process Solutions,  
Phone: 1-800-423-9883  
Or 1-800-343-0228

Email: (Sales)

[ask-ssc@honeywell.com](mailto:ask-ssc@honeywell.com)

or

(TAC)

[hfs-tac-support@honeywell.com](mailto:hfs-tac-support@honeywell.com)

### SOUTH AMERICA

Honeywell do Brasil & Cia  
Phone: +(55-11) 7266-1900  
FAX: +(55-11) 7266-1905

Email: (Sales)

[ask-ssc@honeywell.com](mailto:ask-ssc@honeywell.com)

or

(TAC)

[hfs-tac-support@honeywell.com](mailto:hfs-tac-support@honeywell.com)

*Specifications are subject to change without notice.*

**For More Information**

Learn more about how Honeywell's STT 3000 Series STT800 - STT integrated temperature probe assemblies Models STT820, STT830, STT840, visit our website [www.honeywell.com/ps](http://www.honeywell.com/ps) or contact your Honeywell account manager.

**Honeywell Process Solutions**

1860 West Rose Garden Lane

Phoenix, AZ 85027

Tel: 1-800-423-9883 or 1-800-343-0228

<http://www.honeywell.com/ps/hfs>

The Honeywell logo, consisting of the word "Honeywell" in a bold, red, sans-serif font.

34-TT-03-08

March 2012

© 2010-12 Honeywell International Inc.