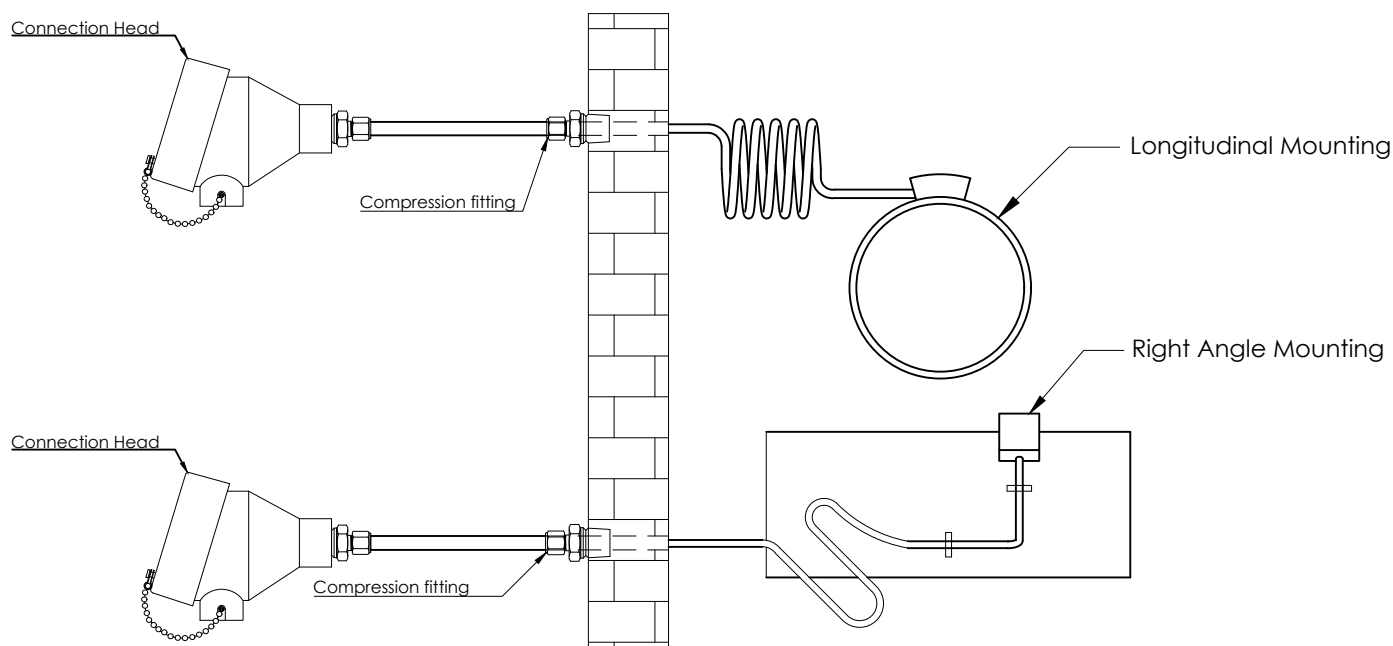


**TC60-2** Tube skin sensors manufactured by Tempotech Controls are precision-engineered devices specifically designed to measure accurate temperature of tube walls in the chemical power and petroleum industries. These thermocouples play a critical role in monitoring boiler and superheater, heat exchanger operations within power plants, Boilers, Chemical processing where precise temperature readings are essential for assessing thermal fatigue and the integrity of tube materials under high-pressure conditions.

The sensors are fabricated using high-quality sheath material that ensures exceptional thermal insulation while accommodating necessary expansion loops. This feature facilitates seamless installation and optimizes the sensors' functionality across various applications, thereby enhancing their longevity and reliability. The weld pads are designed to align with a wide range of tube materials such as Inconel, Monel, Pyrosil, Molybdenum etc and can withstand extreme temperatures of up to 2100°F. Extreme temperature rated material makes them suitable for demanding high-temperature environments where durability is crucial.



### Key Feature:

- Available in type J, K, E, N, T .
- A wide selection of sheath material to suit application requirement, 304ss, 316ss, 321ss, Inconel® 600, Incolloy 800, Monel, Pyrosil D etc.
- Sheath diameter is available from 0.125" to 0.500".
- Available with Explosion proof enclosure CSA, ATEX, FM etc.
- Grounded, and Ungrounded junction to meet application requirement.
- Available with low temp and high temp connectors.
- Available in IEC 60584 & ANSI MC 96.1 standard tolerances



Standard weld pad are 1" x 1" x 1/8" thickness, providing a robust foundation for effective thermal conduction. Additionally, retractable weld pads are available with custom dimensions and thickness, thereby offering flexibility for diverse applications. The pads can also be formed to fit the specific radius of pipes, ensuring an optimal fit for tube surface. To guarantee maximum thermal performance, it is strongly recommended that the weld pads be securely affixed to a stable surface with welding and using mounting clamps, while also avoiding areas with turbulent flow or stagnant conditions in the process, as these may impair measurement accuracy.

# TC-60-2 MGO-PAC Tube Skin Weld Pad Thermocouple with head and Compression Fitting

TEMPERATURE  
SENSOR

## Thermocouple Junction for TC60-2



**Ungrounded Junction:** Junction is similar to grounded junction except wire are fuse welded, which is then insulated with Mgo powder and formed cap by welding without incorporating thermocouple wires. Thus, the junction is called the ungrounded junction.

### Key Benefits :

- Wires are protected from any mechanical damage
- Offers rugged construction, the same as the grounded junction.
- Strain due to differential expansion between wire and sheath is minimized with insulated wires.



**Grounded Junction:** In grounded junction thermocouple wires and sheath of the mineral insulated cable is welded together to form a junction. Thermocouple wires and sheath becomes an integral part of the junction. Thus, the wire is grounded to the sheath.

### Key Benefits:

- Slower response than Exposed junction, but offers rugged construction.
- Can hold higher pressure than exposed junction and Ungrounded junction.

## Suggested Maximum Temperature Limit As per ASTM E608/608M

| Thermocouple Type | °C (F)     | °C (F)     | °C (F)     | °C (F)     | °C (F)     |
|-------------------|------------|------------|------------|------------|------------|
| OD                | 1/8"       | 3/16"      | 1/4"       | 3/8"       | 1/2"       |
| T                 | 315(600)   | 370(700)   | 370(700)   | 370(700)   | 370(700)   |
| J                 | 520(970)   | 620(1150)  | 720(1330)  | 720(1330)  | 720(1330)  |
| K                 | 1070(1960) | 1150(2100) | 1150(2100) | 1150(2100) | 1150(2100) |
| E                 | 650(1200)  | 730(1350)  | 820(1510)  | 820(1510)  | 820(1510)  |

The suggested maximum temperature limit is based on information available in the ASTM standard and test performed in our facility. The maximum temperature limit may change based on the type of process and material/ liquid it is going to be used in. These limits apply to protected thermocouples.

## Temperature Accuracy As per ASTM E608/608M/ IEC 60584 & ANSI MC 96.1 standard tolerances

| Type | Temperature                        | Standard Limit                                                                  | Special Limit                                |
|------|------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------|
| T    | -200 °C to 0 °C<br>0 °C to 350 °C  | ± 1 °C or 1.5% Whichever is greater<br>± 1 °C or .75% Whichever is greater      | N/A<br>± 0.5 °C or 0.4% Whichever is greater |
| J    | 0 °C to 750 °C                     | ± 2.2 °C or .75% Whichever is greater                                           | ± 1.1 °C or 0.4% Whichever is greater        |
| E    | -200 °C to 0 °C<br>0 °C to 900 °C  | ± 1.7 °C or 1.0% Whichever is greater<br>± 1.7 °C or .5% Whichever is greater   | N/A<br>± 1 °C or 0.4% Whichever is greater   |
| KORN | -200 °C to 0 °C<br>0 °C to 1250 °C | ± 2.2 °C or 2.0 % Whichever is greater<br>± 2.2 °C or .75% Whichever is greater | N/A<br>± 1.0 °C or 0.4% Whichever is greater |

### Notes:

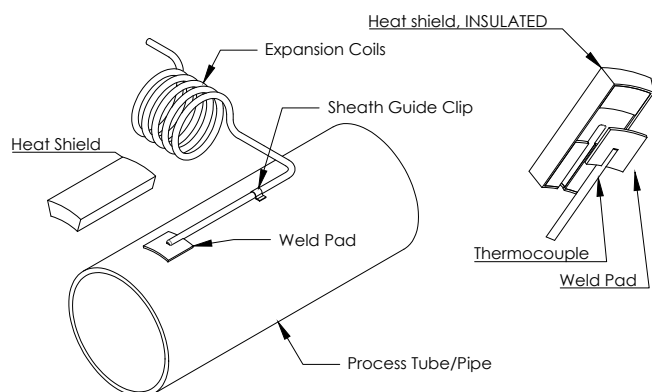
- All the thermocouples are manufactured as ASTM E608/608M
- Calibration is available as per ASTM E220 on request

## Installation:

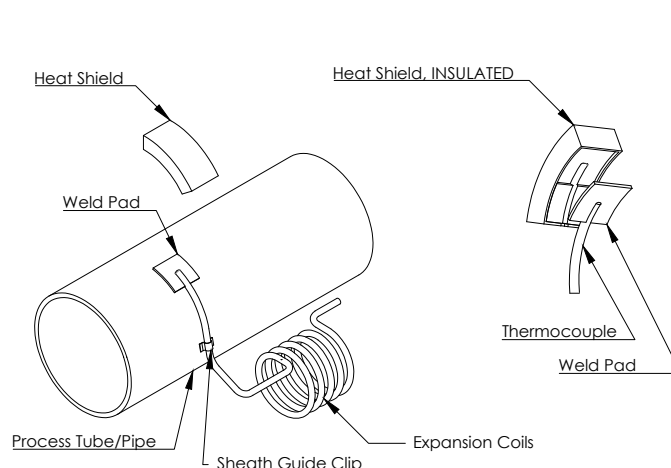
The installation of the tube skin thermocouple through a furnace wall is a straightforward procedure. The temperature probe must be inserted through the wall and secured using a compression fitting designed for high-temperature applications. A second compression fitting should then be attached to the probe to ensure a secure connection at the cold end. Should this mounting approach be necessary for your system, it is important to order an additional compression fitting as an accessory. Each unit will be shipped with the head disassembled to facilitate easy transport and installation.

Moreover, Tempotech Controls acknowledges the necessity for operational flexibility in various industrial contexts. As such, alternative mounting configurations can be customized to meet specific requirements, whether through detailed drawings or by including specifications in the part number description. We invite you to explore our comprehensive range of fitting options, listed in the accompanying ordering symbols, to understand how Tempotech Controls can enhance your industrial processes through our superior tube skin sensors and expertise

### LONGITUDINAL MOUNTING

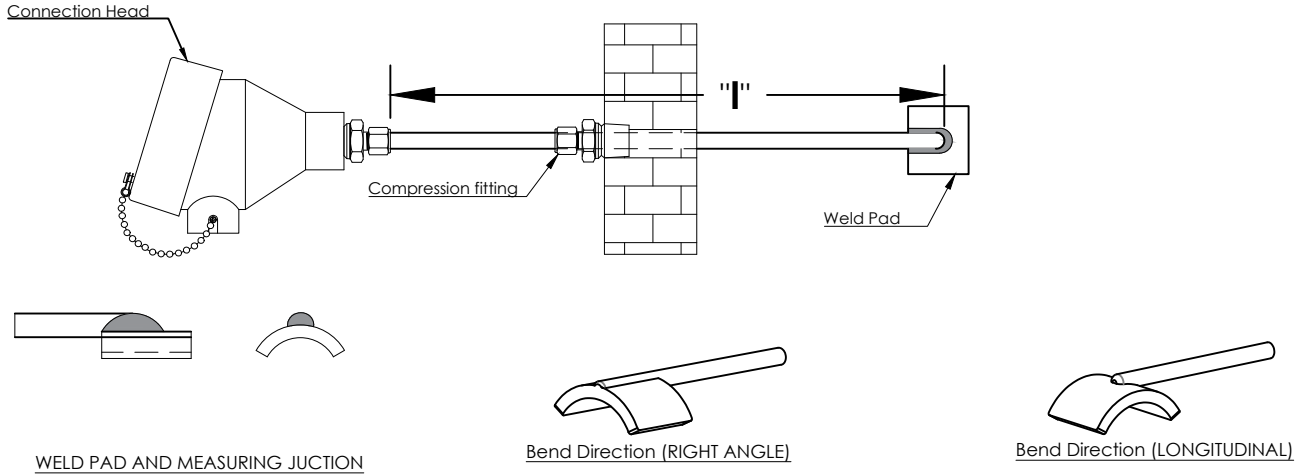


### RIGHT ANGLE MOUNTING



# TC-60-2 MGO-PAC Tube Skin Weld Pad Thermocouple with head and Compression Fitting

**TEMPERATURE  
SENSOR**



|        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|--------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| TC60-2 |   |   |   |   |   |   |   |   |   |    |    |    |    |    |

For Example- TC60-2-K-G-4-8-72i-WF-8-L-11-07-0-TB-0-0

| 1. THERMOCOUPLE TYPE               |                             |
|------------------------------------|-----------------------------|
| CODE                               |                             |
| J                                  | Iron(+) vs Constantan(-)    |
| K                                  | Chromel(+) vs Alumel(-)     |
| T                                  | Copper(+) vs Constantan(-)  |
| E                                  | Chromel(+) vs Constantan(-) |
| N                                  | Nicrosil(+) vs Nisil(-)     |
| Use "S" for Special limit of Error |                             |

| 2. MEASURING JUNCTION |                    |
|-----------------------|--------------------|
| CODE                  |                    |
| G                     | Simplex/Grounded   |
| UG                    | Simplex/Ungrounded |
| DG                    | Duplex/Grounded    |
| DUG                   | Duplex/Ungrounded  |

| 3. SHEATH OD |                           |             |
|--------------|---------------------------|-------------|
| CODE         | IMPERIAL SIZE             | METRIC SIZE |
| 2            | 1/8"                      | 3.2mm       |
| 3            | 3/16"                     | 4.76 mm     |
| 4            | 1/4"                      | 6.35 mm     |
| 6            | 3/8"                      | 9.5 mm      |
| 09           | SPECIFY IF ANY OTHER SIZE |             |

| 4. SHEATH MAT. |             |
|----------------|-------------|
| CODE           |             |
| 8              | SS 316      |
| 4              | SS 310      |
| 9              | SS 304      |
| 6              | SS 321      |
| 3              | INCONEL 600 |

| 5. IMMERSION LENGTH (I)                                      |  |
|--------------------------------------------------------------|--|
| Immersion length - use "I" for inches and "M" for millimetre |  |

| 6. WELD PAD STYLE                      |                  |
|----------------------------------------|------------------|
| CODE                                   |                  |
| WF                                     | Flat             |
| WR-xxx                                 | With Bend Radius |
| SPECIFY RADIUS (For eg. WR-045 = 4.5") |                  |

| 7. WELD PAD MATERIAL |             |
|----------------------|-------------|
| CODE                 |             |
| 8                    | SS 316      |
| 4                    | SS 310      |
| 9                    | SS 304      |
| 6                    | SS 321      |
| 3                    | INCONEL 600 |

| 8. BEND DIRECTION |              |
|-------------------|--------------|
| CODE              |              |
| R                 | Right Angle  |
| L                 | Longitudinal |

| 9. CONNECTION HEAD |                                                 |
|--------------------|-------------------------------------------------|
| CODE               |                                                 |
| A                  | Gen purpose Aluminum head IP68                  |
| EA                 | Economical Aluminum gen purpose head(non-rated) |
| S                  | SS general purpose                              |
| CG                 | Cast iron                                       |
| PG                 | Polypropylene                                   |

| 9. CONNECTION HEAD |                                                                   |
|--------------------|-------------------------------------------------------------------|
| SX                 | SS Explosion proof                                                |
| AX                 | Aluminum explosion proof (CSA,FM,ATEX,IECE'x approved)            |
| 06                 | "Fieldmount Temp Transmitter w/ Display Aluminum"                 |
| 07                 | "Fieldmount Temp Transmitter w/ Display SS"                       |
| 06X                | "Exd Fieldmount Temp Transmitter w/ Display Aluminum"             |
| 07X                | "Exd Fieldmount Temp Transmitter w/ Display SS"                   |
| 09                 | General Purpose Transmitter w/ Loop Powered Indicator             |
| 10                 | Aluminum connection head (CCOE approved)                          |
| 11                 | Wall mount Aluminum explosion proof head (CSA,FM,ATEX approved)   |
| DA                 | Dual entry gen purpose Aluminum head                              |
| D-XD               | Dual entry Aluminum explosion proof (CSA,FM,ATEX,IECE'x approved) |

| 10. CONDUIT CONNECTION |           |
|------------------------|-----------|
| CODE                   |           |
| 05                     | 1/2" NPT  |
| 07                     | 3/4" NPT  |
| 2M                     | M20 X 1.5 |

CONTINUE ON NEXT PAGE

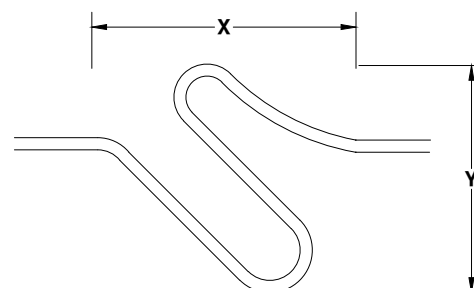
| 11. PROCESS FITTING           |                    |
|-------------------------------|--------------------|
| CODE                          |                    |
| 0                             | Not Required       |
| 11-1. MATERIAL                |                    |
| S                             | Stainless Steel    |
| B                             | Brass              |
| M                             | Mild Steel         |
| 11-2. SIZE                    |                    |
| 2                             | 1/8"               |
| 4                             | 1/4"               |
| 6                             | 3/8"               |
| 8                             | 1/2"               |
| 18                            | M18 X 1.5          |
| 20                            | M20 X 1.5          |
| 11-3. THREAD TYPE             |                    |
| N                             | NPT                |
| B                             | BSP                |
| Leave blank for metric thread |                    |
| 11-4. FERRULE MATERIAL        |                    |
|                               | Leave Blank for SS |
| T                             | Teflon             |
| L                             | Lava               |

| 12. HEAD TERMINATION |                                         |
|----------------------|-----------------------------------------|
| CODE                 |                                         |
| OO                   | Blank Head Ready to Install Transmitter |
| TB                   | Ceramic Terminal Block                  |
| TRM                  | Standard 4-20 mA Transmitter            |
| TRM-H                | Standard 4-20 mA Transmitter w/ Hart    |

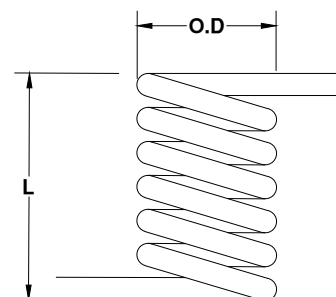
| 13. HEAT SHIELD            |                         |
|----------------------------|-------------------------|
| CODE                       |                         |
| 0                          | No Heat Shield required |
| HS                         | Heat Shield required    |
| 13-1. HEAT SHIELD MATERIAL |                         |
| 8                          | SS 316                  |
| 4                          | SS 310                  |
| 9                          | SS 304                  |
| 6                          | SS 321                  |
| 3                          | INCONEL 600             |

| 14. EXPANSION LOOP STYLE                                                       |                                         |
|--------------------------------------------------------------------------------|-----------------------------------------|
| CODE                                                                           |                                         |
| 0                                                                              | Not Required                            |
| S                                                                              | S Loop                                  |
| MC                                                                             | Multiple coil                           |
| SC                                                                             | Single coil                             |
| 14-1. EXPANSION LOOP DIMENSIONS                                                |                                         |
| S-x-x                                                                          | S for S loop, x for X, x for Y          |
| MC-x-x                                                                         | MC for Multiple coil, x for OD, x for L |
| SC-x                                                                           | SC for Single coil, x for OD            |
| For eg. MC-045-3 = MC is Multiple Coil, 045 is 4.5" OD, 3 is 3" length of coil |                                         |
| See Expansion loop styles on next page                                         |                                         |

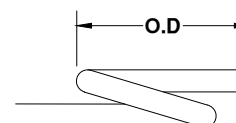
## EXPANSION LOOP STYLE



**S- LOOP**



**MULTIPLE COIL**



**SINGLE COIL**