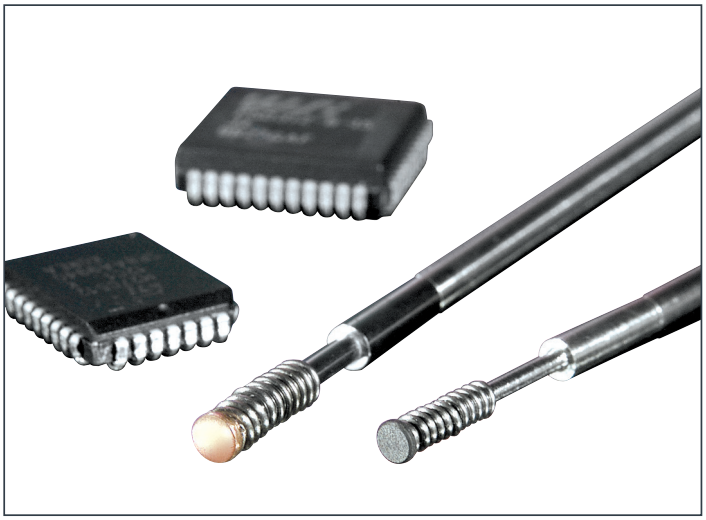
# MICROCOIL™ Thermocouple

## Accurate, Repeatable, Fast Response in Perpendicular Surface Measurement



The MICROCOIL™ miniature thermocouple from Watlow® provides surface temperature measurements that deliver an unparalleled degree of accuracy. This patented technology achieves critical isothermal surface temperature measurement and offers superior design flexibility.

Typical sensor-to-sensor repeatability of one to two percent (DT) can be achieved with the MICROCOIL because sensor areas that are vulnerable to normal production variances are not inside of the thermal gradient. Weld location, insulation thickness and welded tip thickness no longer impact measurement in an isothermal environment. Therefore, the inherent challenges of measuring surface temperatures no longer exist.

The MICROCOIL thermocouple utilizes Watlow's XACTPAK® mineral insulated thermocouple cable. When used with an ungrounded junction, the sensor is electrically isolated from the surface being measured. For higher voltage applications, the aluminum nitride sensor disc option can be used for additional protection.

The helix design of the MICROCOIL thermocouple elicits a faster response time because the surface temperature conducts only through the diameter of the cable and the width of the sensor disk.

Thermal analysis demonstrates the superior performance of the MICROCOIL technology. This patented process achieves critical isothermal area for a long length of a very small cable, ensuring accurate and repeatable measurement.

Standard straight sensors experience poor accuracy of response time, non-repeatable results as well as errors ranging from 20 to 30 percent and higher.

## Features and Benefits

**Miniature size**

- Allows for precision measurement in tight spaces

**XACTPAK mineral insulated thermocouple cable**

- Electronically isolated and shielded 1292°F (700°C) maximum continuous temperature
- Offers exact measurement for demanding applications

**Self leveling and loading**

- Provides superior repeatability of measurement for a wide variety of surfaces

## Typical Applications

- Environmental chambers
- Chip cases
- Heat sinks
- Packaging
- Platens

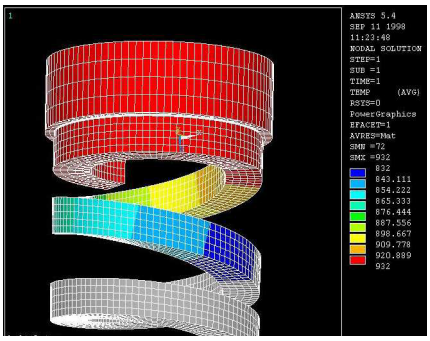
The helix design of the MICROCOIL demonstrates a faster response time because the surface temperature needs to conduct only through the diameter of the cable and the thickness of the sensor disk.

The thermal analysis to the right demonstrates the superior performance of the MICROCOIL technology. This thermocouple achieves the critical isothermal area for a long length of the very small cable, therefore insuring accurate and repeatable measurement.

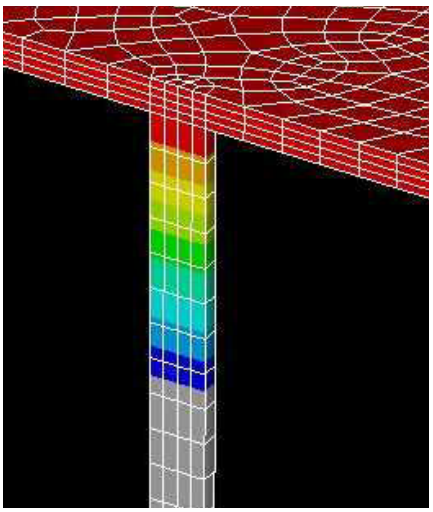
Standard straight sensors exhibit problems including poor accuracy response time and non-repeatable results as well as errors of 20, 30 percent or more.

## Options

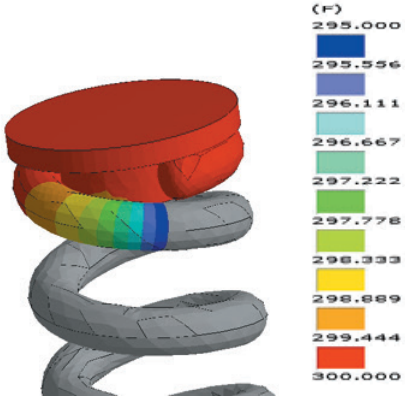
- Dual, isolated thermocouples in the same sensor
- Ungrounded or grounded junction(s)
- Type J or Type K
- RF / IR shield
- Shielded lead wire with drain, either isolated from or connected to the sensor sheath
- Individual sensor calibration




**MICROCOIL Thermal Analysis**



**Straight Thermocouple Thermal Analysis**




**MICROCOIL Thermal Analysis using ANSYS® DesignSpace®**



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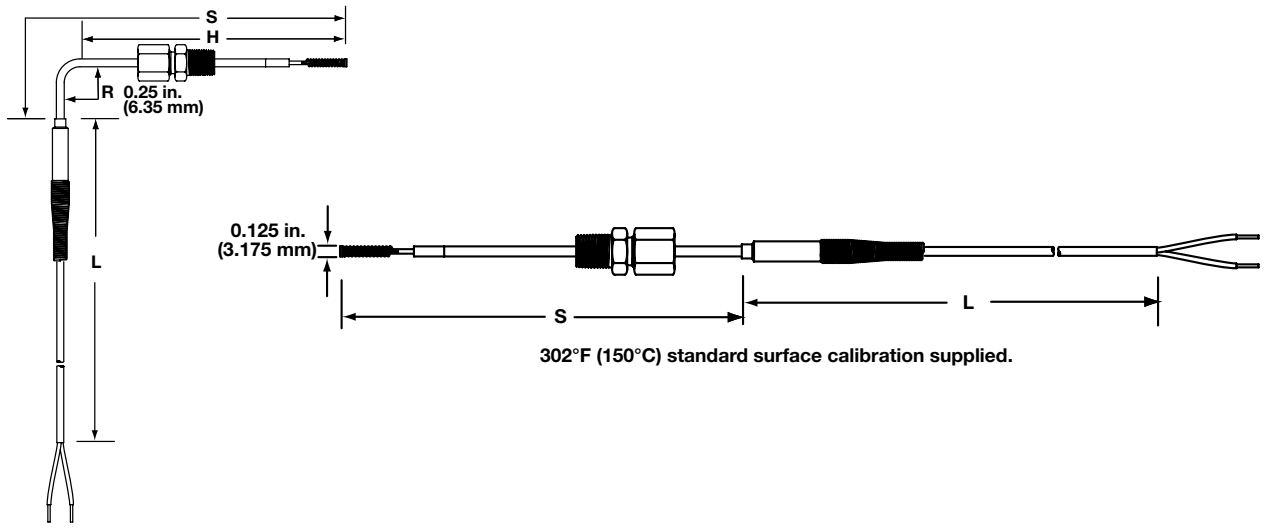
# MICROCOIL




**302°F (150°C) standard surface calibration supplied.**

## Ordering Information

**Part Number**

| ① ② | ③ | ④ | ⑤ ⑥ | ⑦ | ⑧ | ⑨ | ⑩ ⑪ | ⑫ |
|---|---|---|---|---|---|---|---|---|
| | Temp. Rating | Junction Type | Sheath Length "S" | Hot Leg Length "H" | Fitting, Optional | Lead Length Const. | Lead Length "L" | Lead Wire Term. |
| MC | | | | | | | | |

**Type K Calibration**, 0.020 inch diameter Alloy 718 thermocouple sheath, 0.125 inch coil diameter, 12.5 oz approx. spring force for 0.0500 inch compression.

| ③ | Temperature Rating |
|---|---|
| C = | Copper tip 662°F (350°C) max. |
| N = | Aluminum nitride 1292°F (700°C) max. |

| ④ | Junction Type |
|---|---|
| G = | Grounded single junction |
| U = | Ungrounded single junction |

| ⑤ ⑥ | Sheath Length "S" |
|---|---|
| XX = | 02 to 18 in. |

| ⑦ | Hot Leg Length "H", if 90° bend (in.) |
|---|---|
| 0 = | N/A, straight length |
| A = | 1.125 |
| D = | 1.500 |
| H = | 2.000 |
| M = | 2.500 |
| S = | 3.000 |

**Notes:** Bend radius is 0.25 in.
Cold leg length (1 inch min.) = S - H - 0.4 inch
If a fitting is ordered, it will be installed hand tightened onto the hot leg.
If a fitting is ordered, the min. hot leg length "H" is 2.500 in.

| ⑧ | Fitting, Optional |
|---|---|
| 0 = | None |
| C = | Compression fitting, adjustable, 1/8 in. NPT, TFE gland |

| ⑨ | Lead Length Construction, Solid Conductors |
|---|---|
| 1 = | 24 gauge fiberglass |
| 2 = | 26 gauge FEP with shield and drain not attached |
| 5 = | 24 gauge FEP with stainless steel overbraid |

| ⑩ ⑪ | Lead Length "L" |
|---|---|
| XX = | 03 to 99 in. |

| ⑫ | Lead Wire Terminations |
|---|---|
| A = | Standard male plug |
| B = | Standard female jack |
| C = | Standard plug with mating connector |
| F = | Miniature male plug |
| G = | Miniature female jack |
| H = | Miniature plug with mating connector |
| T = | Standard, 1.5 in. split leads |
| U = | 1.5 in. split leads with spade lugs |