

Megopak Thermocouples

Specification

Overview

Function

Megopak Thermocouples are used for sensing temperatures from -200° to 1093°C (-300° to 2000°F).

Description

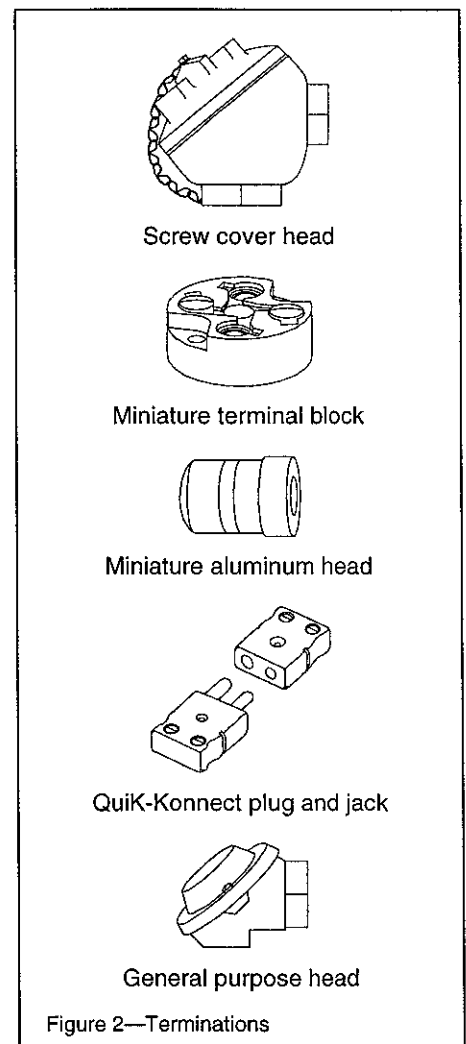
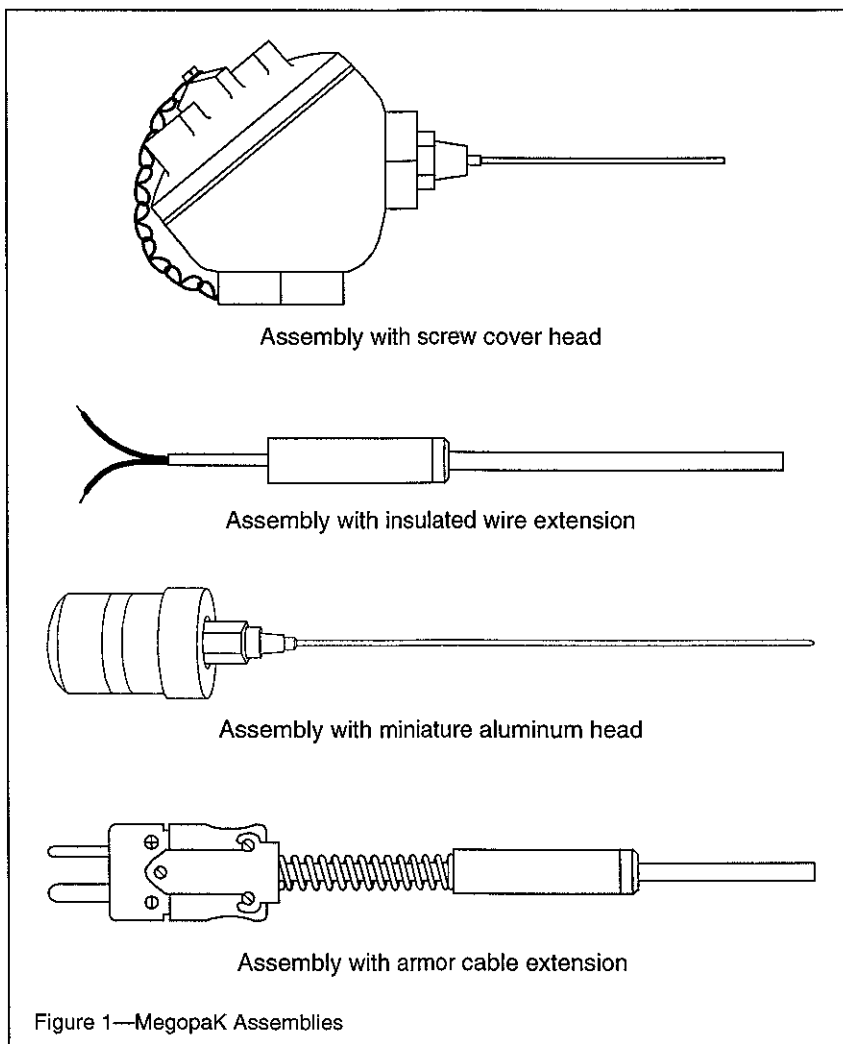
Megopak is a combination of thermocouple wires, mineral insulation, and a protecting sheath drawn into a solid mass of small diameter.

These thermocouples are supplied in three forms:

- A. **Bulk Material**—The basic combination of wires, insulation, and protecting sheath.
- B. **Elements**—Consisting of the basic combination with the wires welded to form a measuring junction (three types of junctions are available).
- C. **Assemblies**—Complete thermocouples consisting of elements plus terminations (heads, plugs, jacks) and mounting attachments (Figures 1 and 2).

Accessories

- Mounting attachments (compression fittings in 1/8, 1/4, or 1/2 inch NPT).
- Brass or 316 stainless steel (not readjustable).
- 303 stainless steel (readjustable).



Specifications

| | | | | | | |
|--|--|--|--------------------------|---|--|--|
| Insulation Composition | 99% magnesium oxide (minimum); 0.001% boron. | | | | | |
| Insulation Resistance (minimum) | 2 megohms at 500 Vdc for 7.62-meter (25-foot) length at room temperature. | | | | | |
| Sheath Material | Type 310, 316 stainless steel or Inconel. | | | | | |
| Sheath Length | Any length up to 15.25 meters (50 feet) in increments of 25 mm (1 inch). | | | | | |
| Bending Radius | One sheath diameter (minimum). | | | | | |
| Speed of Response | The time for test thermocouples to respond to 63.2% of a step change in temperature. | | | | | |
| | Type of Junction | Sheath Diameter | | Speed of Response (Seconds) | | |
| | | mm | inch | From Room Temp. to 100°C (212°F) | From Room Temp. to Salt Bath at 427°C (800°F) | From Still Air at 93°C (200°F) to Still Air at 815°C (1500°F) |
| | Integral (Grounded) | 1.6 | 0.063 | 0.2 | 0.3 | 9.0 |
| | | 3.2 | 0.125 | 0.7 | 1.1 | 16.0 |
| | | 4.8 | 0.188 | 1.5 | 3.0 | 23.0 |
| | | 6.4 | 0.250 | 1.7 | 3.8 | 32.3 |
| 9.5 | | 0.375 | 2.8 | 7.3 | 44.5 | |
| Exposed | 1.6 | 0.063 | 0.1 | 0.1 | 8.3 | |
| | 3.2 | 0.125 | 0.1 | 0.1 | 13.0 | |
| | 4.8 | 0.188 | 0.1 | 0.2 | 21.0 | |
| | 6.4 | 0.250 | 0.1 | 0.2 | 27.0 | |
| | 9.5 | 0.375 | 0.1 | 0.2 | 27.5 | |
| Remote (Insulated) | 1.6 | 0.063 | 0.8 | 0.8 | 9.7 | |
| | 3.2 | 0.125 | 2.2 | 2.8 | 22.0 | |
| | 4.8 | 0.188 | 4.8 | 7.8 | 31.5 | |
| | 6.4 | 0.250 | 7.8 | 9.5 | 42.0 | |
| | 9.5 | 0.375 | 13.5 | 17.6 | 76.0 | |
| Calibration Accuracy | Type of Wire | Limit of Error (whichever is greater) | Temperature Range | Type of Wire | Limit of Error (whichever is greater) | Temperature Range |
| | Type T | ±1°C or ±1.5% | −200 to 0°C | Type E | ±1.7°C or ±0.5% | 0 to 900°C |
| | | ±1°C or ±0.75% | 0 to 350°C | | ±3°F or ±0.5% | 32 to 1600°F |
| | Type J | ±1.5°F or ±2% | −300 to 32°F | Type K | ±2.2°C or ±0.75% | 0 to 1093°C |
| ±1.5°F or ±0.75% | | 32 to 700°F | ±4°F or ±0.75% | | 32 to 2000°F | |
| | ±2.2°C or ±0.75% | 0 to 750°C | | | | |
| | ±4°F or ±0.75% | 32 to 1400°F | | | | |
| NOTE: When the limit of error is given in % the percentage applies to the temperature being measured, not the range. | | | | | | |
| Wire Size and Nominal Sheath Wall Thickness | Approx. Nominal Wire Gauge (B&S) | Sheath | | Approx. Nominal Wire Gauge (B&S) | Sheath | |
| | | Millimeters (Inches) | | | Millimeters (Inches) | |
| | | O.D. | Wall Thickness | | O.D. | Wall Thickness |
| | 29 | 1.6 (0.063) | 0.25 (0.010) | 20 | 4.8 (0.188) | 0.63 (0.025) |
| 23 | 3.2 (0.125) | 0.45 (0.018) | 18 | 6.4 (0.250) | 0.89 (0.035) | |
| | | | 14 | 9.5 (0.375) | 1.32 (0.053) | |
| Recommended Maximum Long-Term Service Temperatures | Sheath Diameter | | | | | |
| | Material | 1.6 mm (0.063") | 3.2 mm (0.125") | 4.8 mm (0.188") | 6.4 mm (0.25") | 9.5 mm (0.375") |
| | Type T | 315°C/600°F | 371°C/700°F | — | — | — |
| | Type J | 649°C/1200°F | 760°C/1400°F | 760°C/1400°F | 871°C/1600°F | 871°C/1600°F |
| | Type K | 871°C/1600°F | 871°C/1600°F | 871°C/1600°F | 982°C/1800°F | 982°C/1800°F |
| Type E | — | — | 871°C/1600°F | 927°C/1700°F | — | |

Ordering Information

For Bulk MegopaK Material, select model number from Table I, and specify length in inches. Longest length available depends on sheath diameter.

EXAMPLE: 2T1M15-60 = Type T with 316 SS sheath 1.6 mm (0.063") diameter and 60 inches long.

For Thermocouple Elements, select model number from Table I followed by a letter selection from Table II plus desired length equal to the specified length plus 2 inches (51 mm) of exposed bare thermocouple wire.

EXAMPLE: 2K3M22-R48 = Type K with Inconel sheath 4.8 mm (0.188") diameter, remote junction and 48 inches long.

For Assemblies, select model number from Table I followed by a letter selection from Table II plus desired length of element in inches and the cold end termination designation from Table III. If mounting attachments and wire extension terminations are needed, make selections from Tables IV and V. Select the required length of insulated extension wire in inches from Table VI.

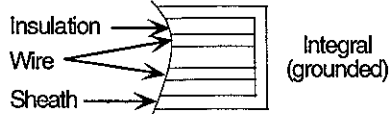
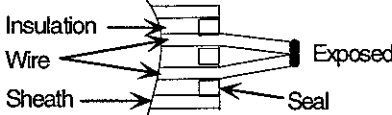
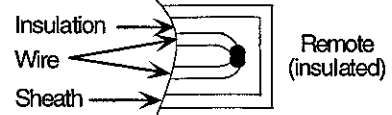
EXAMPLE: 2J1M15-G24-9S-D12-R0000 = Type J with 316 SS sheath 1.6 mm (0.063") diameter integral junction, 24 inch sheath length, 12-inch wire extension length, 316 SS compression fitting, 20 gauge insulated extension wire with fiberglass insulation and armor cable, QuiK-Konnect jack termination on extension wire.

TABLE I—MegopaK Bulk Material

| Element | Sheath Material | Sheath Diameter | | | | |
|---------|---------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | 1.6 mm (0.063") | 3.2 mm (0.125") | 4.8 mm (0.188") | 6.4 mm (0.250") | 9.5 mm (0.375") |
| Type T | 316 Stainless Steel | 2T1M15 | 2T2M15 | --- | --- | --- |
| Type J | Inconel | 2J1M22 | 2J2M22 | 2J3M22 | 2J4M22 | 2J6M22 |
| | 310 Stainless Steel | 2J1M14 | 2J2M14 | 2J3M14 | 2J4M14 | 2J6M14 |
| | 316 Stainless Steel | 2J1M15 | 2M2M15 | 2J3M15 | 2J4M15 | 2J6M15 |
| Type K | Inconel | 2K1M22 | 2K2M22 | 2K3M22 | 2K4M22 | 2K6M22 |
| | 310 Stainless Steel | 2K1M14 | 2K2M14 | 2K3M14 | 2K4M14 | 2K6M14 |
| | 316 Stainless Steel | 2K1M15 | 2K2M15 | 2K3M15 | 2K4M15 | 2K6M15 |
| Type E | 316 Stainless Steel | --- | --- | 2E3M15 | 2E4M15 | --- |

Other types including special sheathing, 4-wire (duplex) type, and special calibrations are available. Consult Honeywell, Fort Washington, PA for complete information.

TABLE II—Types of Measuring Junctions

| Specify Junction Symbol | | Description |
|-------------------------|---|--|
| G* |  | Junction welded to tip of sheath provides faster response time than Type R junction. |
| E* |  | Sheath end is left open. Wires are welded and exposed for a length of one sheath diameter. Sheath end is sealed with cement. Seal is effective up to 538°C (1000°F). |
| R* |  | Junction is insulated from sheath. |

*Add length in inches.

TABLE III—Cold End Terminations

| Type | Specify | Description |
|--------------------------|---------|--|
| Heads | -1 | General purpose head with 1/2" NPT conduit connection |
| | -3 | Screw cover head with 1/2" NPT conduit connection |
| | -4 | Screw cover head with 3/4" NPT conduit |
| | -11* | Miniature aluminum head without mounting bushing |
| | -12* | Miniature aluminum head with 1/4" NPT mounting bushing |
| Terminal Block | -13* | Miniature terminal block without mounting bushing |
| | -14* | Miniature terminal block with 1/4" NPT mounting bushing |
| Plug or Jack | -5* | QuiK-Konnect plug |
| | -6* | QuiK-Konnect jack |
| Insulated Wire Extension | -8† | Insulated wire extension |
| | -9† | Insulated wire extension, armored tubing |
| | -10† | Insulated wire extension, with armored tubing and junction box connector |

*Not available with 9.5 mm (0.375") O.D. sheath.

†These items require selections from Tables V and VI. Maximum temperature rating for standard transition sealant is 204°C (400°F).

TABLE IV—Mounting Attachments (Compression Fittings)

| Specify | Material | Used with Tube Size | | Mounting Thread (NPT) |
|---------|-----------------------------|---------------------|-------|-----------------------|
| | | mm | inch | |
| R* | Brass (not readjustable) | 1.6 | 0.063 | 1/8 |
| | | 3.2 | 0.125 | 1/8 |
| S* | 316 S.S. (not readjustable) | 4.8 | 0.188 | 1/8 |
| | | 6.4 | 0.250 | 1/4 |
| T† | 303 S.S. (readjustable) | 9.5 | 0.375 | 1/2 |

*Fitting is assembled loosely on sheath and can be adjusted as required. After tightening, fitting cannot be relocated.

†Fitting can be readjusted on sheath at any time.

TABLE V—Wire Extension Terminations

| Specify | Description | Available only with Table III Designations |
|---------|--|--|
| A* | No end terminal ... wires bared 13 mm (0.5 in) | 8, 9, 10 |
| B* | Spade lug terminals | 8, 9, 10 |
| C* | QuiK-Konnect plug | 8, 9 |
| D* | QuiK-Konnect jack | 8, 9 |

*Specify desired length of extension wire, in 152 mm (6-inch) increments. Minimum length: 305 mm (12 inches).

TABLE VI—Insulated Extension Wire

| Ordering Number* | | | Insulation | Maximum Temperature Limits** | | Wire Size (B&S Gauge) |
|------------------|--------|--------|--------------------------|------------------------------|------|-----------------------|
| Type J | Type K | Type T | | °C | °F | |
| 3W2P6 | 5W2P16 | 1W2P6 | Polyvinyl over Polyvinyl | 105 | 221 | 20 |
| 9B3C6 | 9B2C6 | — | Tempered Fiberglass | 649 | 1200 | 20 |
| 9B3C7 | 9B2C7 | — | | | | 24 |
| A0000 | | | Fiberglass | 480 | 900 | 20 |
| J0000 | | | Glass and Metal Braid | 480 | 900 | 20 |
| R0000 | | | Glass and Armor | 480 | 900 | 20 |
| C0000 | | | Teflon | 200 | 400 | 20 |
| L0000 | | | Teflon and Metal Braid | 200 | 400 | 20 |
| T0000 | | | Teflon and Armor | 200 | 400 | 20 |

*Specify length of wire required in inches.

**These limits apply to the insulation of the wire extension. The temperature at the transition between thermocouple and wire extension, however, must not exceed 204°C (400°F) unless specifically requested.

Specifications are subject to change without notice.