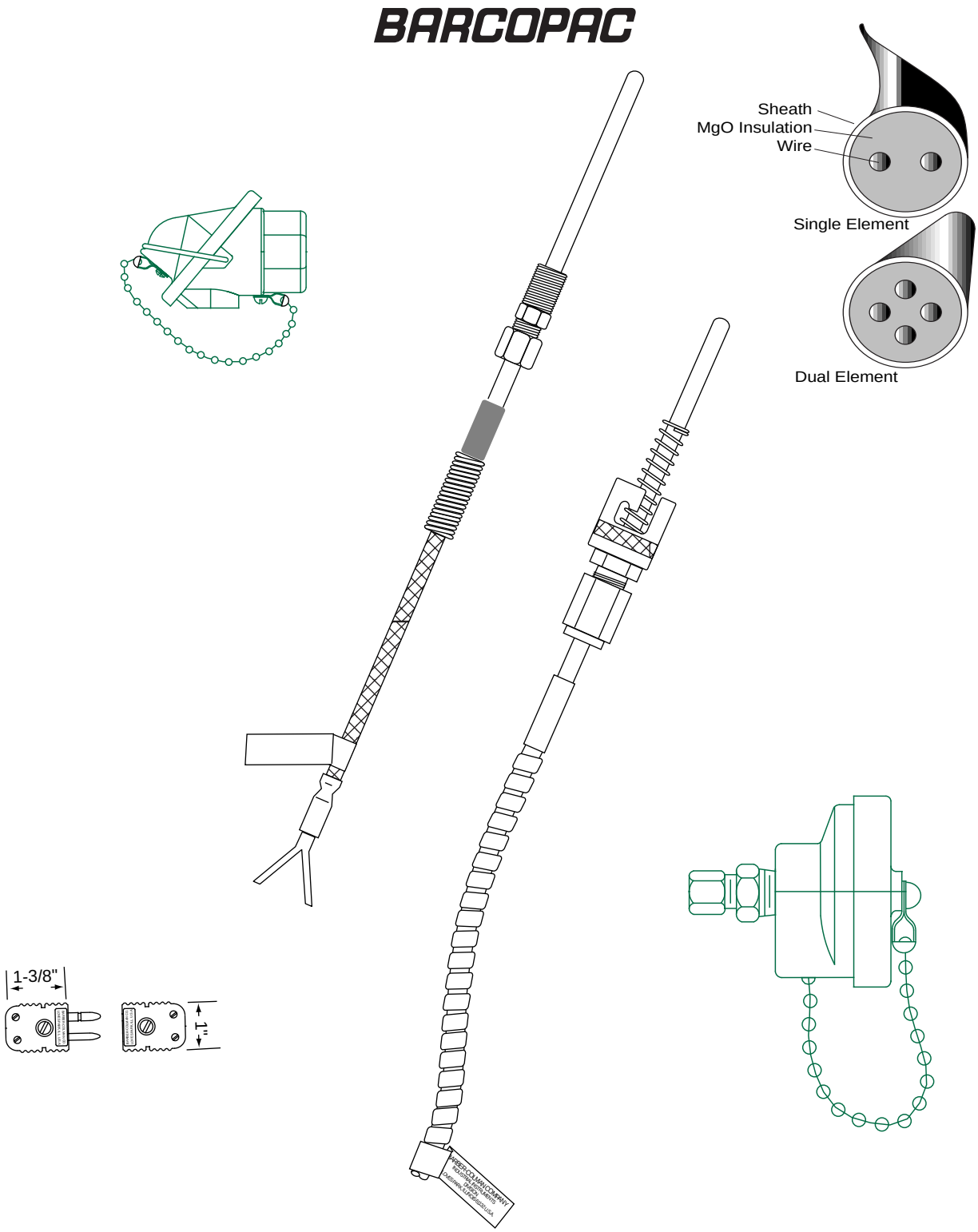


MGO INSULATED THERMOCOUPLES

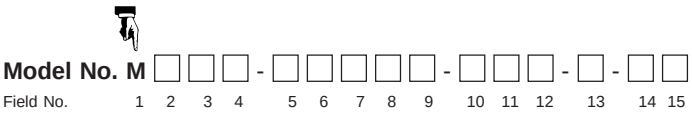
Part Numbers Breakdown

Explanation of MgO Thermocouple Part Number

Introduction

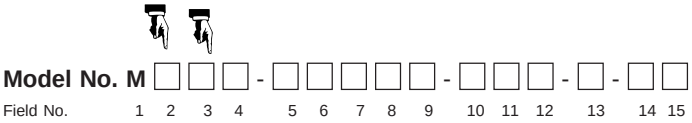
Each model number is made up of codes in 15 fields. Each code, or string of codes, represents a feature of the product. The illustrations below show options available for each field.

Part Number Breakdown



Field 1

Code “M” always occupies field 1. This identifies the sensor as an MgO insulated thermocouple with the BARCOPAC trade name.



Field 2

Thermocouple Type
Codes J, K, E, T indicate thermocouple wire Types J, K, E, T with special limits; codes 1, 2, 3, 4 indicate thermocouple wire Types J, K, E, T with standard limits.

Field 3

Sheath Material
Inconel 600 and three grades of stainless steel are available.

Field 4

Sheath Diameter
Diameters range from 0.040” to 0.250”.

Field 5

Junction Style
This code indicates whether the element is grounded or ungrounded; it also indicates if dual element junctions are isolated or common.

Field 6

Transition, and Flexible Lead
This code indicates whether or not the thermocouple has a flexible lead. If it does, it indicates the lead protection (fiberglass, armor, SS overbraid) as well as the type of transition between the rigid probe and the flexible lead – molded plastic or potted metal casing.

Field 7, 8, 9

Rigid Length
The code in this field specifies the rigid length in whole inches.

Fields 10, 11, 12

Flexible Length
If the thermocouple has a flexible lead, this field specifies the length in whole inches.

Field 13

Mounting Fitting
Indicates the attaching device that mounts the sensor to the workpiece.

Fields 14, 15

Cold End Termination
Indicates how cold end leads are terminated – stripped, lugs, plugs or head.

Magnesium Oxide Insulated Thermocouples (BARCOPAC)

(Also see pad style thermocouples in "Other Sensors" section.)

Introduction

Thermocouples with magnesium oxide insulation are recommended where the thermocouple is immersed in liquids, high moisture, corrosive gases, or high pressures. The thermocouple can be formed to reach otherwise inaccessible areas. The magnesium oxide has a high dielectric strength, responds quickly to temperature changes, and is very durable.

MgO insulated thermocouple wire is manufactured from premium quality wire encased in pure magnesium oxide, and processed into a chemically clean outer metal sheath. The wires are individually selected and matched, and are of uniform cross section with smooth surfaces. Finished stock is warranted to meet ANSI standard limits of error set forth in MC96.1. The unique preparation of MgO insulated thermocouple wire produces a uniform thickness of insulation with high density. The result is a product that is mechanically strong and resistant to penetration of corrosive gases and moisture. The diameters of 0.040" and 1/16" are useful for applications requiring fast response.

Junction Construction

Ungrounded (insulated): Thermocouple insulated from sheath with MgO. Stray EMF is prevented from affecting the reading. Response from rapid or frequent temperature cycling is slower than for grounded style.

Exposed: Thermocouple junction is not protected by welded cap. Used for quick response, but is susceptible to corrosive failure.

Time Constants

The time constant is the amount of time required for a thermocouple to indicated 63.2% of step change in temperature of a surrounding media. Some of the factors influencing the measured time constant are sheath wall thickness, degree of insulation compaction, and distance of junction from the welded cap on an ungrounded thermocouple. In addition, the velocity of a gas past the thermocouple probe greatly influences the time constant measurement.

In general, time constants for measurement of gas can be estimated to be ten times as long as those for measurement of liquid. The time constant also varies inversely proportional to the square root of the velocity of the media.

Approximate time constants for different sheath diameters in water are shown below for a step change from 0 to 100°C:

Sheath Diameter	Grounded Junction	Ungrounded Junction	Exposed Junction
0.040"	0.2 second	0.7 second	0.1 second
0.063"	0.3 second	0.8 second	0.2 second
0.125"	0.5 second	1.3 seconds	0.3 second
0.188"	1.0 second	2.5 seconds	0.5 second
0.250"	2.3 seconds	4.3 seconds	0.6 second

Specifications

Insulation Purity

MgO densely packed. High purity 99.4% MgO is used only with types K and S, Inconel sheathing. All others are standard purity 96% MgO.

Minimum Bend Diameter

Two times the outside diameter of the sheath.

Temperature Ratings

Oxidizing atmospheres: temperature ratings vary depending on sheath diameter, sheath material, and type calibration. Sheath wall thickness, contaminants, abrasion, and erosion must be considered.