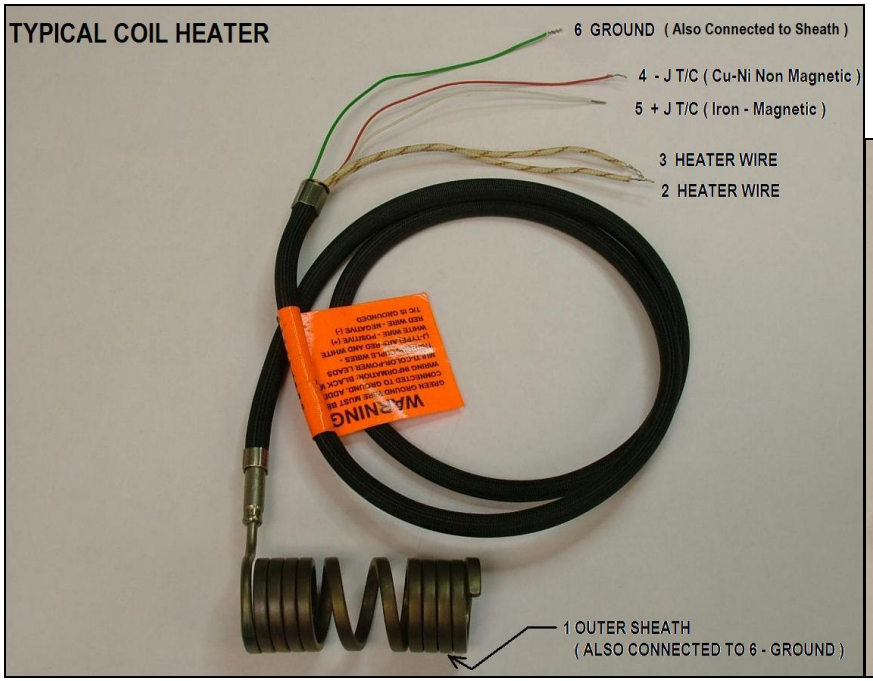
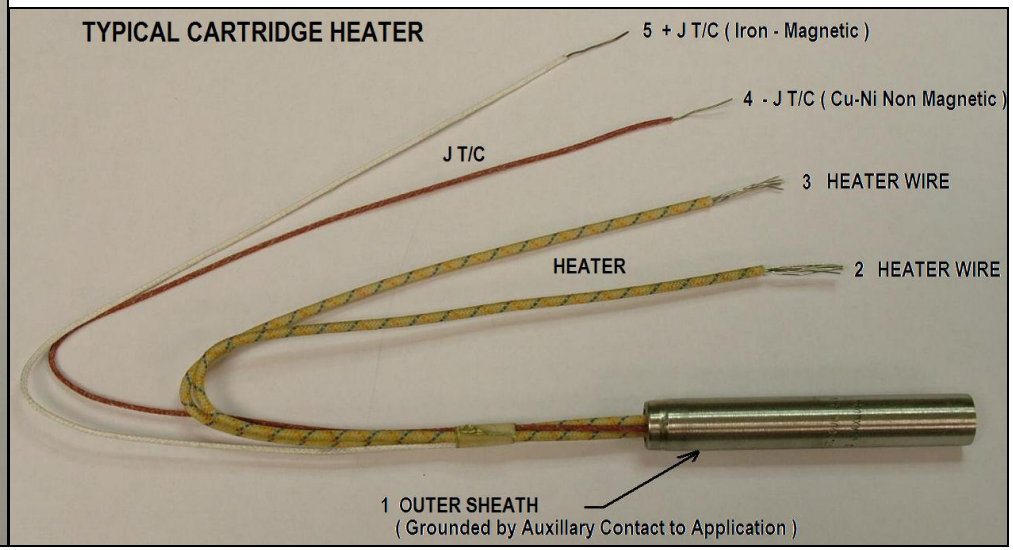
Engineering Application Note: Typical Electrical Heater Diagnostics Date: 9-9-2008

The following Application Technical Note gives guidelines for Diagnosing a Typical Electrical Heater for the Injection Plastics Industry.
*** HEATERS BEING CHECKED MUST BE DISCONNECTED FROM POWER AND CONTROLLERS ***





Step 1: Measuring Heater Resistance Between Wires 2 and 3 shown above. Digital Volt Meter set for Resistance (Ohms = Ω - Note: KΩ = 1,000 Ω, MΩ = 1,000,000 Ω)

Measure Resistance of Your Heater = _____Ω
Calculate Resistance of Your Heater = (Rated Voltage x Rated Voltage) / Rated Wattage. = _____ Ω

Typical Heaters:

Rated Wattage	Rated Voltage	Calculated Resistance in Ohms (Ω = Ohms)	Typ. Tolerance +/- 20% of Cal. Resistance
1,000 Watts	240 Vac 1 Phase	57.6 Ohms	+/- 11.6 Ohms
500 Watts	240 Vac 1 Phase	115.2 Ohms	+/- 23.0 Ohms
250 Watts	240 Vac 1 Phase	230.4 Ohms	+/- 46.1 Ohms
100 Watts	240 Vac 1 Phase	576.0 Ohms	+/- 115.2 Ohms

Step 2: Check for Heater Short to Ground (Measure Resistance from each heater wire 2 & 3 going to 1 Outer Sheath and/or 6 Ground wire)
Resistance from a heater lead to the outer sheath of the heater should be High.
Rule of thumb would be greater then 57,600 ohms if the heater has moisture in it (this is 1 Watt being dissipated to ground at 240 Vac until heater dries out), preferably much higher and in the MegaOhms if the heater is completely dry. (Hot Runner controls with dry out routines Like DME patented Smart Start helps.)

Step 3: If thermocouple is integrated into this heater, then you can do the following. (Basically check to see if it is OPEN or has Broken Wires Internal.)
A Thermocouple is like a very small battery which produces micro and milli-Volts. You can check resistance, but may get some funny readings, but it should NOT be OPEN or MegaOhms. Typically should be less than 100 Ohms. Some thermocouples are grounded and some are ungrounded, and some may Not be specified. Finding low resistance to the outer sheath or ground does not necessarily indicate a bad thermocouple.