

## Scope of Accreditation For Furnace Parts, LLC

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In recognition of a successful assessment to ISO/IEC 17025:2005, accreditation is granted to **Furnace Parts, LLC** to perform the following **Calibrations**:

Accreditation granted through: **September 8, 2012**

### Calibration

#### Electricity and Magnetism – Voltage

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) <sup>1</sup>	Remarks
DC Volts <sup>2</sup> Source	0 mV to 100 mV 0 V to 1 V 1 V to 10 V 10 V to 100 V	4 μV + 3 μV/V 38.4 μV + 10 μV/V 388 μV + 100 μV/V 3.8 mV + 1 mV/V	Calibration by comparison to Process Calibrator
DC Volts <sup>2</sup> Measure	0 mV to 100 mV 0 V to 1 V 1 V to 10 V 10 V to 100 V	4.5 μV + 0.9 μV/V 29.1 μV + 2 μV/V 281 μV + 40 μV/V 4 mV + 0.5 mV/V	Calibration by comparison to DMM

#### Electricity and Magnetism – Current

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) <sup>1</sup>	Remarks
DC Current Source	0 mA to 100 mA	6 μA + 1 μA/A	Calibration by comparison to Process Calibrator
Measure	0 mA to 50 mA	5.9 μA + 1 μA/A	

**Electricity and Magnetism – Thermocouple Simulation**

<b>Calibration Parameter/Equipment</b>	<b>Range</b>	<b>Calibration and Measurement Capability(+/-) <sup>1</sup></b>	<b>Remarks</b>
Type B Thermocouple Source	1 112 °F to 1 472 °F 1 472 °F to 1 832 °F 1 832 °F to 2 822 °F 2 822 °F to 3 308 °F	1.06 °F 0.92 °F 0.94 °F 1.03 °F	Calibration by comparison to Process Calibrator
Type B Thermocouple Measure	1 112 °F to 1 472 °F 1 472 °F to 1 832 °F 1 832 °F to 2 822 °F 2 822 °F to 3 308 °F	1.05 °F 0.92 °F 0.93 °F 1.02 °F	
Type C Thermocouple Source	32 °F to 302 °F 302 °F to 1 202 °F 1 202 °F to 1 832 °F 1 832 °F to 3 272 °F 3 272 °F to 4 201 °F	0.77 °F 0.7 °F 0.78 °F 1.13 °F 1.8 °F	
Type C Thermocouple Measure	32 °F to 302 °F 302 °F to 1 202 °F 1 202 °F to 1 832 °F 1 832 °F to 3 272 °F 3 272 °F to 4 201 °F	0.76 °F 0.69 °F 0.78 °F 1.12 °F 1.8 °F	
Type E Thermocouple Source	-418 °F to -148 °F -148 °F to -13 °F -13 °F to 662 °F 662 °F to 1 202 °F 1 202 °F to 1 832 °F	1.13 °F 0.57 °F 0.54 °F 0.55 °F 0.63 °F	
Type E Thermocouple Measure	-418 °F to -148 °F -148 °F to -13 °F -13 °F to 662 °F 662 °F to 1 202 °F 1 202 °F to 1 832 °F	1.13 °F 0.56 °F 0.53 °F 0.54 °F 0.61 °F	
Type J Thermocouple Source	-346 °F to -148 °F -148 °F to -22 °F -22 °F to 302 °F 302 °F to 1 400 °F 1 400 °F to 2 192 °F	0.72 °F 0.6 °F 0.56 °F 0.57 °F 0.65 °F	

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) <sup>1</sup>	Remarks
Type J Thermocouple Measure	-346 °F to -148 °F -148 °F to -22 °F -22 °F to 302 °F 302 °F to 1 400 °F 1 400 °F to 2 192 °F	0.71 °F 0.59 °F 0.54 °F 0.55 °F 0.64 °F	Calibration by comparison to Process Calibrator
Type K Thermocouple Source	-328 °F to -148 °F -148 °F to -13 °F -13 °F to 248 °F 248 °F to 1 832 °F 1 832 °F to 2 502 °F	0.81 °F 0.64 °F 0.56 °F 0.7 °F 0.94 °F	
Type K Thermocouple Measure	-328 °F to -148 °F -148 °F to -13 °F -13 °F to 248 °F 248 °F to 1 832 °F 1 832 °F to 2 502 °F	0.81 °F 0.63 °F 0.54 °F 0.69 °F 0.94 °F	
Type N Thermocouple Source	-328 °F to -148 °F -148 °F to -13 °F -13 °F to 248 °F 248 °F to 770 °F 770 °F to 2 372 °F	0.94 °F 0.66 °F 0.59 °F 0.57 °F 0.72 °F	
Type N Thermocouple Measure	-328 °F to -148 °F -148 °F to -13 °F -13 °F to 248 °F 248 °F to 770 °F 770 °F to 2 372 °F	0.94 °F 0.65 °F 0.58 °F 0.56 °F 0.71 °F	
Type R Thermocouple Source	32 °F to 482 °F 482 °F to 752 °F 752 °F to 1 832 °F 1 832 °F to 3 182 °F	1.28 °F 0.85 °F 0.81 °F 0.94 °F	
Type R Thermocouple Measure	32 °F to 482 °F 482 °F to 752 °F 752 °F to 1 832 °F 1 832 °F to 3 182 °F	1.28 °F 0.84 °F 0.8 °F 0.93 °F	

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) <sup>1</sup>	Remarks
Type S Thermocouple Source	32 °F to 482 °F 482 °F to 1 832 °F 1 832 °F to 2 552 °F 2 552 °F to 3 182 °F	1.25 °F 0.87 °F 0.89 °F 1.05 °F	Calibration by comparison to Process Calibrator
Type S Thermocouple Measure	32 °F to 482 °F 482 °F to 1 832 °F 1 832 °F to 2 552 °F 2 552 °F to 3 182 °F	1.24 °F 0.86 °F 0.88 °F 1.05 °F	
Type T Thermocouple Source	-418 °F to -238 °F -238 °F to 32 °F 32 °F to 248 °F 248 °F to 752 °F	1.38 °F 0.66 °F 0.56 °F 0.53 °F	
Type T Thermocouple Measure	-418 °F to -238 °F -238 °F to 32 °F 32 °F to 248 °F 248 °F to 752 °F	1.37 °F 0.65 °F 0.54 °F 0.51 °F	

**Electricity and Magnetism – RTD Simulation**

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) <sup>1</sup>	Remarks
Pt 385 100 Ω Source	-328 °F to 1 472 °F	0.16 °F	Calibration by comparison to Process Calibrator
Pt 385 100 Ω Measure	-328 °F to -112 °F -112 °F to 212 °F 212 °F to 752 °F 752 °F to 1 116 °F 1 116 °F to 1 472 °F	0.028 °F 0.043 °F 0.064 °F 0.1 °F 0.121 °F	

**Thermodynamic – Thermocouples <sup>3</sup>**

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) <sup>1</sup>	Remarks
Type B Thermocouple	1 100 °F to 2 000 °F 2 000 °F to 2 700 °F	1.8 °F 0.13 % of reading	Calibrated by comparison per ASTM E220
Type C Thermocouple	32 °F to 1 000 °F 1 000 °F to 2 000 °F 2 000 °F to 2 700 °F	1.6 °F 1.8 °F 0.13 % of reading	
Type E Thermocouple	-110 °F 32 °F 100 °F to 1 000 °F 1 000 °F to 1 600 °F	0.9 °F 0.8 °F 1.7 °F 1.8 °F	

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) <sup>1</sup>	Remarks
Type J Thermocouple	-110 °F 32 °F 100 °F to 1 000 °F 1 000 to 1 400 °F	0.9 °F 0.8 °F 1.7 °F 1.8 °F	Calibrated by comparison per ASTM E220
Type K Thermocouple	-110 °F 32 °F 100 °F to 1 000 °F 1 000 °F to 2 000 °F 2 000 °F to 2 300 °F	0.9 °F 0.8 °F 1.7 °F 1.9 °F 0.11 % of reading	
Type N Thermocouple	-110 °F 32 °F 100 °F to 1 000 °F 1 000 °F to 2 000 °F 2 000 °F to 2 300 °F	0.9 °F 0.8 °F 1.7 °F 1.9 °F 0.11 % of reading	
Type R Thermocouple	32 °F to 1 000 °F 1 000 °F to 2 000 °F 2 000 °F to 2 700 °F	1.6 °F 1.8 °F 0.13 % of reading	
Type S Thermocouple	32 °F to 1 000 °F 1 000 °F to 2 000 °F 2 000 °F to 2 700 °F	1.6 °F 1.8 °F 0.13 % of reading	
Type T Thermocouple	-110 °F 32 °F 100 °F to 752 °F	0.9 °F 0.8 °F 1.7 °F	

**Notes:**

- 1) Calibration and Measurement Capability represents expanded uncertainties at approximately a 95% confidence level using a coverage factor of k=2.
- 2) Voltage ranges are for both positive and negative values.
- 3) Calibrated thermocouples meet the requirements of AMS 2750 and ASTM E230.

Approved by:



 R. Douglas Leonard Jr.  
Chief Technical Officer

 Date: July 14, 2010