Pre-Calibrated Models

ACCURACY

IRt/c's are pre-calibrated at the factory for typical target material emissive properties, but actual emissivities may differ. The accuracies specified assume that the precalibrated value is correct for your installation, or that the single point set up of Tech Note #1 has been performed to reduce the error to zero at the calibration point (which is normally the set point for a temperature control system).

1. Using Non-Programmable Thermocouple Interface Devices

Standard non-programmable thermocouple input devices deliver a high level of accuracy and repeatability with IRt/c's for most temperature measurement and control of factory automation, process control and OEM machinery. For example, if an IRt/c is calibrated to measure and control a non-metal target at 200°F (90°C) set point, the error will be ±0% or ±0.02°F (0.01°C) at the set point. As the target temperature varies from the original set point temperature, the error increases slightly according to the Accuracy Table (below). For example, if the interface device is set for 0% error at 200°F (90°C), then at the extremes of the temperature range of 190°F to 210°F (87°C to 99°C), the error would be ±0.4% or 1°F (0.6°C). This gradual error is caused by a difference in linearity between the output of the IRt/c compared to standard thermocouples. For detailed explanation, consult Tech Note #89.

2. Using Programmable Thermocouple Interface Devices, OEM, PLC, Computers

With programmable controllers, microprocessors, PLC, or computer interface, the error can be reduced to a small value even over a very wide temperature range. As shown in the Accuracy Table, IRt/c's produce high accuracies over a wide temperature range when the application requires it. For programming, contact Exergen for output signal tables.

Accuracy Table

Target Temperature Variation	Non-Programmable Thermocouple Interface	Programmable Thermocouple Interface
	Error* (greater of)	
0°F (0°C)	0% or 0.02°F (0.01°C)	0% or 0.02°F (0.01°C)
±5°F (± 3°C)	± 0.2% or 0.5°F (0.3°C)	0% or 0.02°F (0.01°C)
±10°F (± 6°C)	± 0.4% or 1.0°F (0.6°C)	± 0.1% or 0.3°F (0.2°C)
±20°F (± 12°C)	± 1% or 2°F (1°C)	± 0.2% or 0.5°F (0.3°C)
±40°F (± 24°C)	± 2% or 4°F (2°C)	± 0.3% or 0.8°F (0.5°C)
±75°F (± 42°C)	± 5% or 8°F (5°C) approx.	± 0.5% or 1.2°F (0.3°C)
±180°F (± 100°C)	> 5% or 8°F (5°C)	± 1% or 2°F (1°C)
±540°F (±300°C) or full range	> 5% or 8°F (5°C)	± 2% or 4°F (2°C)

*Percent is of reading. For wide target temperature variations, target emissivity variations may cause greater errors. Multipoint calibration is recommended in such cases, and can reduce errors to less than 0.1%.

3. Repeatability Error is < 0.01°C (0.02°F)

Repeatability error, defined as the ability of the IRt/c to reproduce a reading under the identical conditions, is extraordinarily small. There are no active electronics to shift, and no source of spurious signals until the limit of resolution is reached, which is 0.0001°C, due to Johnson noise.

4. Interchangeability Error is ± 1% or 0.5 °C (1 °F)

Interchangeability error, defined as the difference in reading between any two IRt/c's of the same model making identical measurements, is of particular importance to users of multiple IRt/c's such as OEM's, or when an IRt/c must be replaced. The unit-to-unit consistency of IRt/c's permits the same calibration settings to be used for all subsequent installations for the same target material and temperatures. Interchangeability specification applies only to the signal generated by the IRt/c in its precalibrated range.

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