EXERGEN
CORPORATION

*Smart*IRt/c™ Infrared Temperature Sensor

Key Features:

- Easy to use
- Application Versatility
- Wide Operating Range
- 3:1 Field of View
- Linear Output
- Rapid Update

- Choice of Outputs (0-5V, 0-10V, 4-20mA and RS232)
- Extremely High Accuracy and Repeatability
- Air Purge and Mounting Included
- Self Diagnostics

- Continuous Self-Calibration
- Case Temperature Output
- Alarms/Triggers Available
- Compact, Rugged Construction
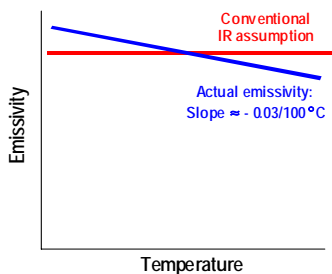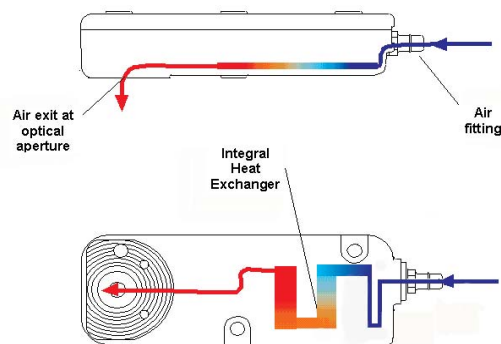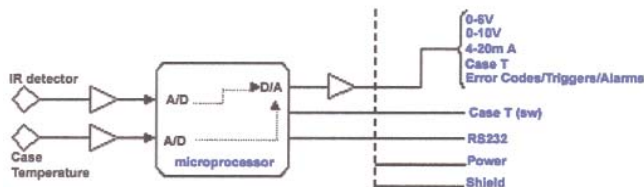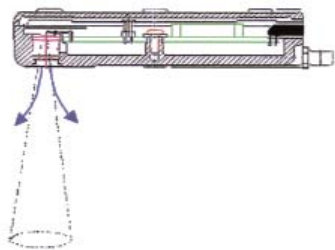- LED Indicating Normal Operation and for Diagnostics

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*Smart*IRt/c™
Infrared Temperature Sensor

**Accuracy ...
That Never Misses!**

Sensing Range*	0 °C to 250 °C (32 °F to 482 °F); 0 °C to 100 °C (32 °F to 212 °F)
Ambient Temperature Range	0 °C to 70 °C (32 °F to 158 °F)
Storage Temperature Range	-10 °C to 70 °C (14 °F to 158 °F)
Field of View	3:1 (distance: spot) approx. 17°
Minimum Spotsize	3 mm (.12")
Dominant Spectral Response	5.5 - 20 microns (other ranges for specific applications)
Output Types	0-5 V; 0-10 V; 4-20 mA (50 ohm max.); RS-232
Emissivity Setting	e = 0.90 May be adjusted for large quantities
TA Toggle (Option)	Pull down below 0.5V for at least one response time
TA Output (Option)	0 °C - Minimum output; 70 °C - 70 % Maximum output
Max. Switch Time for Toggle	One Response Time
Resolution	Approximately 0.1% of full scale
Update Time	approx 250 ms
First Reading Upon Powering Up	approx 2 s
Accuracy (Includes Repeatability and Interchangeability)	± 1% or (1 °C (1.8 °F)) at e = 0.9
Repeatability	± 1 bit
Interchangeability	± 0.5% or (1 °C (1.8 ºF))
*Error Codes	Upper and lower 1% of range dedicated to error codes
Power Supply	12 or 24 V DC (± 10%) Shuts off when voltage is functionally low
Power Consumption	< 800 mW at 24 V DC and < 600 mW at 12 V DC
Size	88.9 x 31.8 x 19.1 mm (3.5 x 1.25 x 0.75 in.)
Housing	ZA-12 Zinc– aluminum alloy
Air Purge Pressure	0.1 to 20 millibar
Humidity	95% Non-Condensing
Weight	Approximately 200 grams (7 oz.)
LED	Indicates normal operation and for diagnostics

Application Examples:

- Printing
- Laminating
- Glass
- Web Profile
- Painting

- Coating
- Plastic Film
- Rubber
- Paper
- Food Processing

- Asphalt
- Textiles
- Drying
- Agriculture

- Non-Contact Measurement
- Easy to Use "Plug and Play Design"
- Permanent Drift-Free High Accuracy
- Best Price/Performance of Any IR Sensor

*Smart*IRt/c™ Ten Compelling Reasons For Accuracy

1. Easy to Use

Simply attach the sensor utilizing the mounting holes built into the sensor and connect the unit to power and a controller. If air purge is desired, plug the air supply into the unit's connector. This is all that is required to use the powerful *Smart*IRT/c and all of its features. No special knowledge of thermocouples or thermal management is needed. The *Smart*IRt/c does all this for you. It is that easy and the sensor is ready to use.

2. All Digital System

Unlike many units where the outputs are determined by analog circuitry, the *Smart*IRt/c's outputs and signals are decided upon as a result of purely digital computation by a microprocessor. Drift and environmental concerns are thus avoided.

3. Powerful Processor

The *Smart*IRt/c is centered around a high-speed, state-of-the-art microprocessor that continously monitors and adjusts the complete system. While performing the complex algorithms determining the output, it also calibrates itself approximately once every second removing any concerns over drift or sudden changes.

4. Smart Air Purge

- Integral design prevents dust, dirt, or condensing vapors from depositing on sensor optics, assuring long term accuracy under all environmental conditions.
- Integral heat exchanger automatically warms (or cools) supply air to match the optical aperture temperature, eliminating drift.
- Integral design accepts air pressure supply range of 0.05 to 10 in. H2O (0.1 to 20 millibar) allowing use of any available fan for air supply, eliminating need for compressed air and associated costs.
- When sensor is within 1/2 in. (1.3 cm) of surface moving at least 20 ft/sec (6 m/sec), Bernoulli forces will automatically draw air through the Smart Air Purge without any pressure source at all.
- Air volume range drawn is 0.01 to 0.1 CFM (0.2 to 2 liters/ min), easily supplied by any fan already in place.
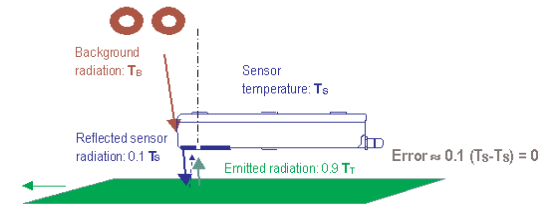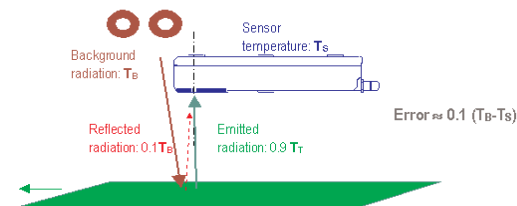
5. Smart Emissivity Shift Compensation

Standard assumption for conventional IR sensors is constant emissivity with change in material surface temperature. Real materials, however, do not behave this way. On average for nonmetals, the emissivity reduces by 3% for every 100°C increase in material temperature. The *Smart*IRt/c is programmed to automatically shift the expected emissivity by this amount, and thus improve the accuracy.

6. Smart Ambient Radiation Error Correction

TOP Reflected energy from the target to be measured is approximately 10% (if emissivity is approximately 0.9) of the temperature of the background source. When the sensor is distant from the target, the sensor detects the combined emitted radiation (0.9 TT) plus reflected radiation (0.1 TB), which produces an error of 0.1(TB-TS) when the background is at a different temperature than the sensor.

BOTTOM When the sensor is moved close to the target, the blackened area of the sensor emits radiation that replaces the background radiation (which is now considerably reduced), resulting in zero error under all conditions.

7. Smart Housing

- Withstands mechanical shocks >100g.
- Thermally conductive casting maintains uniform temperature
- Thermal shock resistance maintains accuracy to 2°C under the following conditions:
  - 500°C heat gun for 30 seconds
  - 1000°C torch for 10 seconds
  - Dry ice at -230°C for 7 minutes

8. Smart Continuous Auto-Calibration

- Recalibrates sensor electronics once per second automatically
- Eliminates electronic drift that causes inaccuracies

9. Automatic Self-Diagnostics

Providing a complete set of diagnostics and status information, the *Smart*IRt/c is continuously monitoring itself, the target and the environment. While performing a continuous auto-calibration, it will output a set of signals informing the user if the target temperature is out of range, the ambient temperature is outside limits, heat flow is outside limits, power is too low, local EMI noise makes any reading unreliable or the unit cannot calibrate itself. Thus, the user or control system has complete knowledge of the unit's condition.

10. Smart Six-Variable Calibration

While all vendors will calibrate for gain and offset, the SmartIRt/c takes into account not only the first order effects but also second order effects including sensitivity coeffcients. No sensor has experienced such an in-depth evaluation and been subjected to this procedure. The end result provides the best possible accuracy under all operating conditions.