

Pre-Calibrated Models

Factory-calibrated to match thermocouple signals over selected temperature ranges • For non-metal surfaces (coated metals are acceptable) • For use with “thermocouple input” controllers, PLCs, transmitters, and recorders available worldwide • All sensors exceed NEMA 4, 4X; IP65, 67; and are intrinsically safe.

<p>IRt/c.01</p> <p>IRt/c.03</p>	<h2 style="text-align: center;">Light-duty Models</h2> <p>Excellent for light-duty OEM equipment • High-strength ABS housing with mounting/lock nuts • Extension grade thermocouple wire with PVC jacket, unshielded • Rated for up to 160 F(70 C) ambient. • Small size allows easy design into existing OEM products • Target temperatures from -50 to 550F (-45 to 290C)</p>	
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<p>IRt/c</p> <p>IRt/c.1X</p> <p>IRt/c.3X</p>	<h2 style="text-align: center;">Stainless Steel Models</h2> <p>Rated for up to 212 F (100 C) ambient • Cooling jackets available for up ambients to 1000 F (540 C) • Tiny sizes allow easy installation in tight spaces • Twisted shielded base thermocouple wire, Teflon sheathed, rated to 392 F (200 C) • IRt/c.1X and .3X include threaded nose, lock-nuts, and mounting bracket • IRt/c.3X includes very high efficiency air-purge for dusty, misty, or dirty environs • Target temperatures from -50 to 1200F (-45 to 650C)</p>	
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<p>IRt/c.5</p> <p>IRt/c.10</p>	<h2 style="text-align: center;">Stainless Steel, Lensed Models</h2> <p>5:1 and 10:1 fields of view • Ideal for use at longer distances • Twisted shielded base thermocouple wire, Teflon sheathed, rated to 392 F (200 C) • Rated for up to 212 F(100 C) ambient • Built-in air purging/air cooling to 500 F(260 C) • Target temperatures from -50 to 1200F (-45 to 650C)</p>	
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<p>IRt/c.SV</p> <p>IRt/c.3SV</p>	<h2 style="text-align: center;">Stainless Steel “Side View” Models</h2> <p>Easily mounted in narrow spaces • Rated for up to 212 F(100 C) ambient • Twisted shielded base thermocouple wire, Teflon sheathed, rated to 392 F (200 C) • IRt/c.3SV includes built-in air purge for dusty, misty or dirty environs • Target temperatures from -50 to 1200F (-45 to 650C)</p>	
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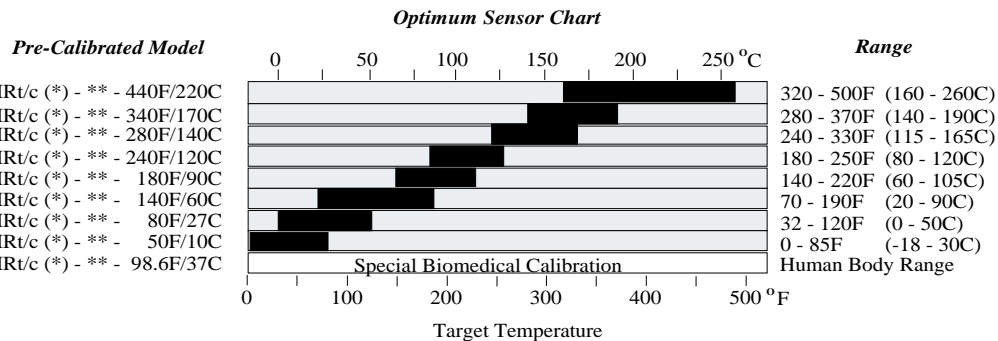
Signal Output	Thermocouple type J,K,E,T over temperature range specified (IRt/c.10, Type K only)
Power requirements	None
Cold Junction Compensation	By measuring instrument, as with conventional thermocouples
Emissivity	0.9, for non-metal surfaces
Repeatability	0.01°C
Ambient Temperature Coefficient	0.02% of reading/°F (0.04% /°C) (See Tech Note #90)
Response Time Constant	0.1 seconds approximately
Resolution	0.0001°C approximately
Spectral Response	6.5 to 14 microns
Output Cable	Twisted shielded pair of base thermocouple material (J,K,etc.), 3 ft (.9 m) std length, Teflon sheathed rated to 392°F (200°C) continuous service. (Except IRt/c.01 and IRt/c.03)

Selecting a Pre-Calibrated IRt/c

Ordering information: (Model) - (Thermocouple Type) - (Pre-Calibrated Temperature Range)

1. Select IRt/c(*) model. Example: IRt/c.3X
2. Select the thermocouple type (**) desired (J, K, etc.), add it to the model name.
Example: IRt/c.3X-K
3. Select the target temperature range. For example, to control a lamination process at 200 F (93 C), look at the following target temperature table for 200 F (93 C). Note the black area in the table indicates the "180F/90C" pre-calibrated range. Add this to complete your selection.

Example: IRt/c.3X - K - 180F/90C.



Additional note: The above table indicates the temperature ranges where the IRt/c's match standard thermocouple signals. This allows for highly accurate measurement and control in the ranges selected. IRt/c's require no power supply and can be connected directly to thermocouple inputs of controllers, PLC's, transmitters, and other t/c devices.

In addition, all IRt/c sensors are useable over the entire specified target temperature range for each sensor. Signal output tables and polynomials are available from Exergen.

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 $\pm 0\%$ or $\pm 0.02^\circ\text{F}$ (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 $\pm 0.4\%$ 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 Error* (greater of)	Programmable Thermocouple Interface
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.

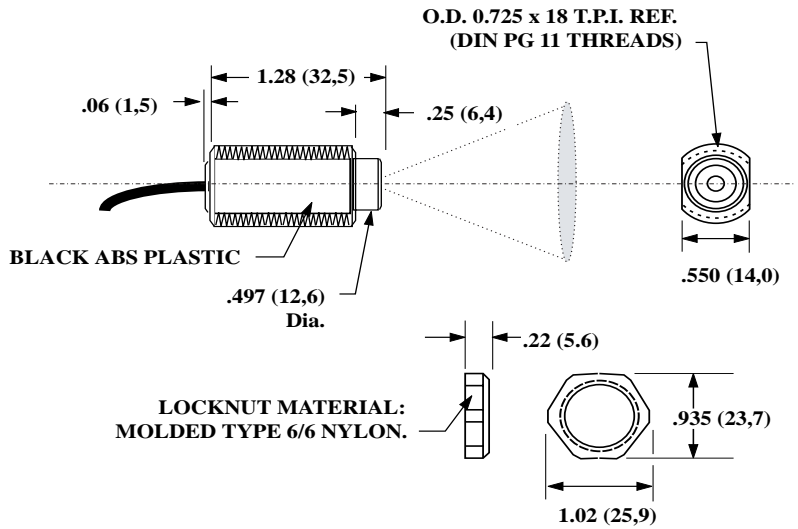
4. Interchangeability Error is ± 1% or 0.5 °C (1 °F)

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.

Pre-Calibrated Models

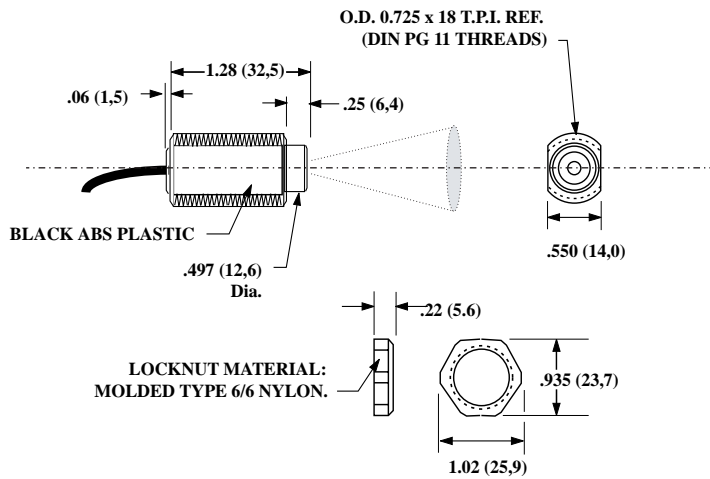
IRt/c.01

1:1 Field-of-View



IRt/c.03

3:1 Field-of-View



	IRt/c.01	IRt/c.03
Sensing Range	-50 to 550°F (-45 to 290°C)	
Ambient Temperature Range	0 to 160°F (-18 to 70°C)	
Optimum Range Selections	Eight models per t/c type (see Temperature Selection Guide)	
Field-of-View	1:1 (60°) approximately	3:1 (17°) approximately
Minimum Spot Size	0.3" (8 mm)	0.25" (6 mm)
Spectral Response	6.5 to 14 μ	
Output Impedance	3 Kohms approx.	4 to 8 Kohms approx.
Cable	Thermocouple extension grade, PVC jacket, unshielded	
Dimensions	1.28"x .71" Dia. (32.5 x 20 mm)	
Weight	1.4 oz (40 g) with cable	
Housing	High strength ABS, hermetically sealed, exceeds NEMA 4,4x; IP65,67, intrinsically safe. Two locknuts supplied.	

Pre-Calibrated Models

IRt/c
1:1 Field-of-View

IRt/c.SV
1:1 Field-of-View
Side View

IRt/c.1X
1:1 Field-of-View

*IRt/c.1X includes ss mounting bracket and locknuts.

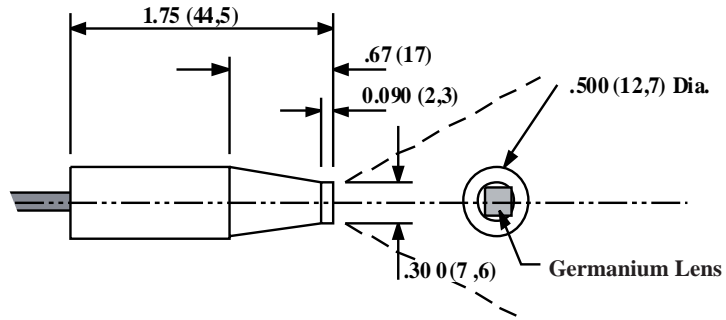
	IRt/c	IRt/c.SV	IRt/c.1X
Sensing Range	-50 to 1200°F (-45 to 650°C)		
Ambient Temperature Range	0 to 212°F (-18 to 100°C)		
Optimum Range Selections	Eight models per t/c type (see Temperature Selection Guide)		
Field-of-View	1:1 (60°) approximately		
Minimum Spot Size	0.3" (8 mm)		
Spectral Response	6.5 to 14 μ		
Output Impedance	3 Kohms approx		
Cable	Twisted shielded pair of base thermocouple material (J,K,etc.), 3 ft (.9 m) std length, Teflon sheathed, rated to 392°F (200°C) continuous service.		
Dimensions	1.75" x 0.50" Dia. (44 x 12.7 mm)	2.27" x 0.50" Dia. (57.8 x 12.7 mm)	1.43" x 0.50" Dia. (36 x 12.7 mm)
Weight	1.4 oz (40 g) with cable		
Housing	Stainless steel, hermetically sealed, exceeds NEMA 4,4x; IP65,67, intrinsically safe, cable shield grounded to housing and electrically isolated from signal.		

IRt/c Models

Precalibrated Models

IRt/c.2 G-J-37

Special Performance
Medical Model



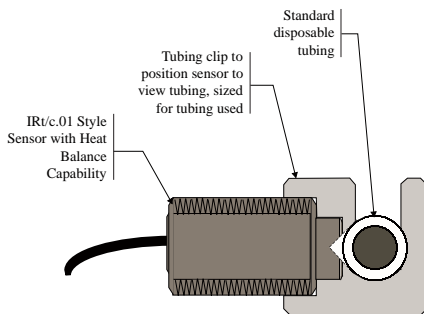
IRt/c.2 G-J-37 (Medical Model)	
Sensing Range	Human Body Temperature
Optimum Range Selections	+/- 0.2°C from 35.5 to 39.4°C +/- 0.3°C from 25 to 40°C
Field-of-View	1:1 (60°) approximately
Minimum Spot Size	0.16" (4 mm)
Spectral Response	2 to 20 μ
Output Impedance	10 Kohms approx
Cable	Twisted shielded pair of base thermocouple material (J,K,etc.), 3 ft (.9 m) std length, Teflon sheathed, rated to 392°F (200°C) continuous service.
Dimensions	1.75" x 0.500" Dia. (44 x 12.7 mm)
Weight	1.4 oz (40 g) with cable
Housing	Stainless steel, hermetically sealed, exceeds NEMA 4,4x; IP65,67, intrinsically safe, cable shield grounded to housing and electrically isolated from signal.
Air Purge	none

IRt/c.01HB-J-37C

Infrared Thermocouple for
Non-invasive Fluid
Temperature in Medical
Tubing



See Tech Note #99

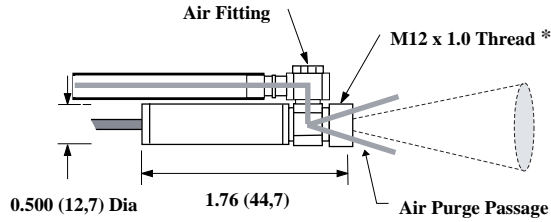


IRt/c.01HB-J-37C	
Sensing Range	0 to 50°C
Output Signal	Type J or K (specify)
Power Requirement	None
Accuracy	±0.2°C (specify calibration temperature)
Repeatability	±0.01°C
Speed of Response	0.1 sec approximately (not including tubing)
Tubing Size Range	0.3 to 1.0" (8 to 25 mm) O.D.
Output Impedance	3 KΩ approx
Optical Window	Pure Germanium crystal, can be cleaned with all common cleaners.
Cable	Thermocouple extension grade, PVC jacket, unshielded
Dimensions	2.0" x 1.0" Dia. (51 x 25 mm)
Weight	1.7 oz (48 g) with cable
Housing	High strength ABS, hermetically sealed, meets or exceeds all applicable NEMA ratings, intrinsically safe. Clips to tubing.

Precalibrated Models

IRt/c.3X

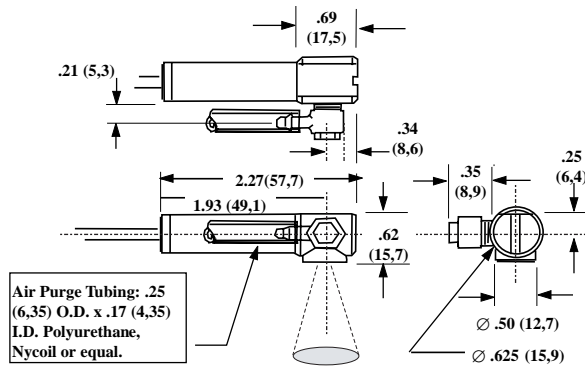
3:1 Field-of-View
Built-in Air Purge



*IRt/c.3X includes ss mounting bracket and locknuts.

IRt/c.3SV

3:1 Field-of-View
Built-in Air Purge

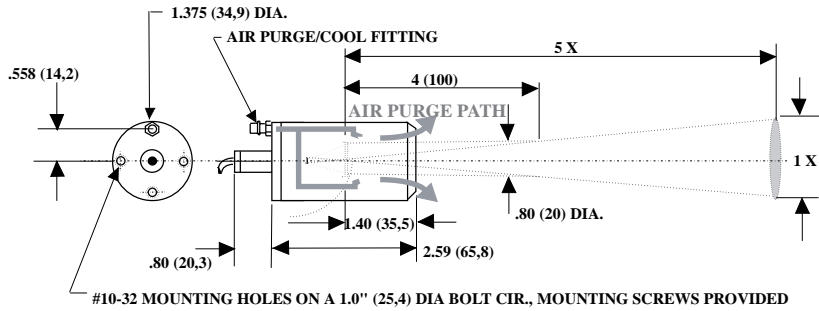


	IRt/c.3X	IRt/c.3SV
Sensing Range	-50 to 1200°F (-45 to 650°C)	
Optimum Range Selections	Eight models per t/c type (see Temperature Selection Guide)	
Field-of-View	3:1 (17°) approximately	
Minimum Spot Size	0.25" (6 mm)	0.2" (5 mm)
Spectral Response	6.5 to 14 μ (2 to 20 μ with IRt/c.3XG germanium lens)	6.5 to 14 μ
Output Impedance	4 to 8 Kohms approx	
Cable	Twisted shielded pair of base thermocouple material (J,K,etc.), 3 ft (.9 m) std length, Teflon sheathed, rated to 392°F (200°C) continuous service.	
Dimensions	1.76" x 0.50" Dia. (44.7 x 12.7 mm)	2.27" x 0.500" Dia. (57.8 x 12.7 mm)
Weight	1.4 oz. (40 g) with cable	1.6 oz (44 g) with cable
Housing	Stainless steel, hermetically sealed, exceeds NEMA 4,4x; IP65,67, cable shield grounded to housing and electrically isolated from signal.	
Air Purge	Built-in; designed for severe paint or ink environment; 3' (0.9 m) of tubing provided.	

Precalibrated Models

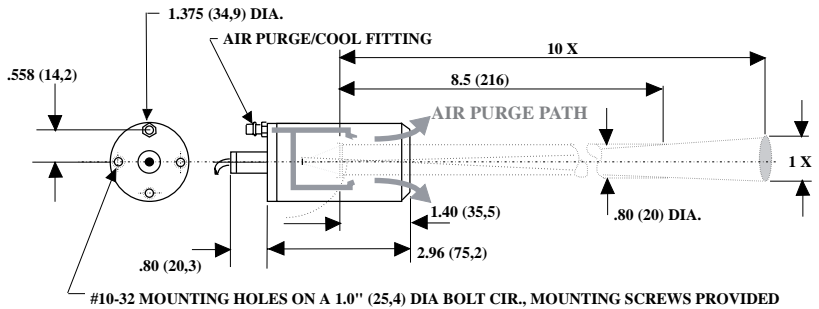
IRt/c.5

5:1 Field-of-View, Built-in Air Purge



IRt/c.10

10:1 Field-of-View, Built-in Air Purge



IRt/c Models

	IRt/c.5	IRt/c.10
Sensing Range	-50 to 1200°F (-45 to 650°C)	
Optimum Range Selections	Eight models per t/c type (see Temperature Selection Guide)	
Field-of-View	5:1 (11°) approximately	10:1 (6°) approximately
Minimum Spot Size	0.8" (20 mm)	
Spectral Response	6.5 to 14 μ	
Output Impedance	4 to 8 Kohms approx	
Cable	Twisted shielded pair of base thermocouple material (J,K,etc.), 3 ft (.9 m) std length, Teflon sheathed, rated to 392°F (200°C) continuous service.	
Dimensions	3.4" x 1.375" Dia. (86 x 35 mm)	3.76" x 1.375" Dia. (96 x 35 mm)
Weight	6.5 oz (184 g) with cable	
Housing	Stainless steel, hermetically sealed, exceeds NEMA 4,4x; IP65,67, intrinsically safe, cable shield grounded to housing and electrically isolated from signal.	
Air Purge	Built-in; cooling capacity to 400°F (200°C) ambient; 3' (0.9 m) polyurethane tubing provided	