

## Rayotube

## Model Selection Guide

KEY NUMBER	Description	Selection Availability
	Honeywell Rayotube	0018890 ↓

**TABLE I - TEMPERATURE RANGE**

Temperature Range	Blackbody Output (mV)	Allowance Range of Target Emittance	Compensator Range (mV)		
200 to 1000°F	0.06 to 3.5	0.5 to 1.0	1 to 5	0163	•
650 to 1400°F	0.22 to 3.37	0.3 to 1.0	1 to 5	1019	•
750 to 1600°F	0.36 to 5.74	0.87 to 1.0	5 to 25	3302	•
		0.17 to 0.87	1 to 5		
800 to 1800°F	0.43 to 9.18	0.54 to 1.0	5 to 25	0073	•
450 to 1000°C		0.11 to 0.54	1 to 5	0076	•
1100 to 2300°F	1.12 to 24	0.2 to 1.0	5 to 25	0074	•
600 to 1260°C		0.04 to 0.2	1 to 5	3881	•
1200 to 2600°F	1.12 to 24	0.2 to 1.0	5 to 25	0035	•
650 to 1400°C		0.04 to 0.2	1 to 5	0077	•
1375 to 3000°F	1.12 to 24	0.2 to 1.0	5 to 25	0412	•
750 to 1650°C		0.04 to .2	1 to 5	0537	•
1500 to 3300°F	1.12 to 24	0.2 to 1.0	5 to 25	0075	•
825 to 1800°C		0.04 to 0.2	1 to 5	0078	•
1650 to 3600°F	1.12 to 24	0.2 to 1.0	5 to 25	1729	•
		0.04 to 0.2	1 to 5		
1850 to 4000°F	1.02 to 21.80	0.2 to 1.0	5 to 25	0643	•
975 to 2200°C		0.04 to 0.2	1 to 5	0135	•
2130 to 4600°F	1.12 to 24	0.2 to 1.0	5 to 25	0216	•
1160 to 2500°C		0.04 to 0.2	1 to 5	0760	•
2500 to 5000°F	1.12 to 24	0.2 to 1.0	5 to 25	5423	•
1250 to 2800°C		0.04 to 0.2	1 to 5	2133	•

**TABLE II - FOCUS IN INCHES**

Length		
4	104	•
6	106	•
7 to 12	109	•
12 to 16	113	•
16 to 24	118	•
24 to Infinity	124	•

**TABLE III - MOUNTING & SAFETY OPTIONS****Selection Availability**

Description		
None	000	•
Air/Water Cooling Jacket for Inconel Tube	310	•
Air Cooling with Integral Air Purge for Inconel Tube	320	•
Air/Water Cooling Jacket with Air Purge (Nozzle) for Inconel Tube	330	•

**TABLE IV - SIGHTING/TARGET TUBES**

Material	Type	Length		
None			00000	•
Inconel	Sighting	12"	41512	•
		18"	41518	•
		24"	41524	•
		30"	41530	•
	Target	12"	42512	•
		18"	42518	•
		24"	42524	•
		30"	42530	•

**TABLE V - OPTIONS**

Description		
None	000	•
mV Adjustment Screw Unsealed	601	•

**TABLE VI - TAGGING**

None	000	•
Linen Tag	206	•
SS Tag (22 characters max.)	208	•

## Honeywell Rayotube

### SPECIFICATIONS

#### General

**Type:** Radiation type temperature detector, optical system mirror type with image-viewing lens.

**Element:** Thin-film (TF) Thermocouple

**Resistance:** Approx. 1500 ohms

**Time Constant:** 0.015 seconds

**Range:** 200 to 5000°F. See Table I (5.1-3-2) Ranges for temperature spans

**Size:** Diameter 3-5/16"; Length 3-5/8"

**Housing:** Brass alloy forging nickel plated hermetically sealed

**Mounting:** Forced air or Water Cooled Jackets

**Connections:** Screw-terminals (2) on covered terminal block

#### ENVIRONMENTAL

**Ambient Temperature:** 32 to 212°F

**Pressure:** 40 psig maximum

**Vibration:** 1g at 10 to 200 Hz

**Relative Humidity:** Up to 90% at 104°F

#### PERFORMANCE CHARACTERISTICS

**Spectral Response:** 0.3 to 10.5 microns on range 0163 (200-1000°F) 0.3 to 4.5 microns on all other ranges.

**Stability:** Within 1.0% over 6000 hours at 130°F ambient

**Calibration:** Each unit is calibrated for blackbody conditions. Tolerance and conformity to curve is 1% over entire range.

**Temperature Coefficient:** Output at a given temperature will not change by more than 1% for a 100°F ambient temperature change.

### TARGET DIAMETER

Minimum target diameter can be determined by the following equation:

$$\frac{18890 \text{ Rayotubes}}{T = X (D + 2.5)}$$

$$T = X (D + 2.5)$$

Where: T = Target diameter in inches

D = Distance from front window to target in inches.

X = Target factor.

f = 3.165 for 12" to 23" and 3.67 for 24" to 60".

#### Minimum Target Diameters of Most Generally Used Detectors

Distance "D" Inches	18890
4	0.117
8	0.189
9	0.21
12	0.26
15	0.315
19	0.37
20	0.40
24	0.48
30	0.59
36	0.70
42	0.81
48	0.91
60	1.125

### FOCUS

All Rayotube and Spectray detectors are prefocused as specified. When ordering, the distance "D" from the detector window to the target should be specified in inches. In the case of complete assemblies, distance to the window equals total distance from target to detector window including tube and mounting assembly.

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### ORDERING INSTRUCTIONS

#### Table I - Temperature Range

For best readability, choose range so that temperature of interest is in upper third of range span.

#### Table II - Focus

Prefocused at factory. Cannot be re-focused in field.

#### Table III - Mounting & Safety Options

Mounting Jacket - Provides dual function. Used to mount the Rayotube to the assembly and has provisions for forced cooling when ambient temperature exceeds 212°F (100°C).

Forced air *or* water cooling - no air purge

Forced air with integral air purge. Used to purge a sighting tube when smoke, fumes, dust, etc. are *not severe*.

Forced air *or* water cooling with air nozzle. Air nozzle is used for purging the sighting tube when smoke, fumes, dust, etc. *are extreme*. Occasionally, used to prevent seepage of fumes into target tube.

Safety Shutter - For target tube applications. If tube breaks, high temperature will cause a bimetallic trip to close a shutter to provide temporary protection from furnace environment. Trip is actuated at 212°F. Readout device will go to low end of range.

Safety Shutter and Safety Switch with lever actuated microswitch. Because closing of shutter causes readout device to drive to low end of scale causing automatic control to open fuel valve to maximum position, *every safety shutter installed in conjunction with automatic control application must have safety switch*.

#### Table III - Sighting/Target Tubes

Sighting (open end) tubes are used when it is possible to measure the target directly. Typical applications are temperatures of moving objects, surfaces, etc.

Target (closed end) tubes are used to measure the temperature of a furnace atmosphere or other medium.

**Inconel:** 80% Nickel, 15% Chromium Alloy upper temperature limit 2100°F. Do not use in sulfur atmospheres or where producer gas is used as fuel. Has high mechanical strength, very rugged, should be used in place of ceramic tube when conditions permit, where work in furnace may strike tube or where work is withdrawn frequently.