No.S-HK0004

SPECIFICATION INFORMATION OF INDUSTRIAL PLATINUM FILM RESISTANCE TEMPERATURE SENSOR CRZ R SERIES

HAYASHI DENKO

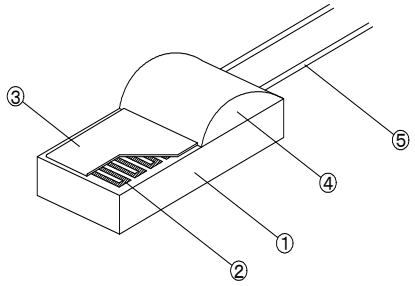
Products

No.S-HK0003

This specification note is applied to CRZ platinum thin film resistance temperature detectors produced by Hayashi Denko Co., Ltd..

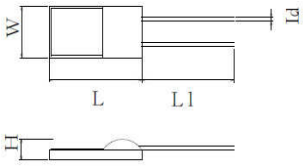
Standard:
JIS C 1604- 1997 Resistance Thermometer Sensors
IEC 751- 1983 Industrial platinum resistance thermometer sensors

Construction



	Part name	Material
①	Substrate	high purity Alumina
②	Thin film circuit	Platinum
③	Protection Layer	Glass
④	Connection Reinforcement	Glass
⑤	Lead wire	Au-plated Nickel

Dimension



Model	Dimension (mm)				
	L	W	H	Ll	Ld
	±0.2	± 0.2	± 0.2	± 2.0	± 0.05
CRZ2005R	5.0	2.0	1.1	11.0	0.2
CRZ1632R	3.2	1.6	1.1	11.0	0.2

Rated Specification

Item	Content	
Model	CRZ2005R	CRZ1632R
Resistance value	Pt100, Pt500, Pt1000	Pt100
TCR	3851ppm/℃	
Tolerance	JISC1604-1997 Class 1/3B, A , B, 2B Refer to Table : Tolerance *1/3B = F 0.1, A = F 0.15, B = F 0.3, and 2B = F 0.6 to IEC60751:2008	
Measuring Current	Pt100: 1mA or Less Pt500 and Pt1000: 0.5mA or less	Pt100: 1mA or Less
Operating Temperature Range	Class 1/3B: −20 to +150 ℃ Class A: −40 to +300 ℃ Class B and 2B: −70 to +400 ℃	
Limit Temperature Range *	Class 1/3B: +250 ℃ Class A: +400 ℃ Class B and 2B: +500 ℃	

* The temperature ranges are the maximum temperatures that elements can maintain the class at 0 ℃ after the drift due to the temperature stress after temporary exposed in high temperature.
In that temperature above the operating temperature ranges, elements cannot maintain class accuracies.

Tolerance

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Class	Tolerance/℃	Tolerance at 0℃	
		Resistance Value Ω*	Temperature ℃
1/3B (F0.1)	±(0.1+0.0017|t|)	±0.04	±0.1
A (F0.15)	±(0.15+0.002|t|)	±0.06	±0.15
B (F0.3)	±(0.3+0.005|t|)	±0.12	±0.3
2B (F0.6)	±(0.6+0.01|t|)	±0.25	±0.6

|t|: absolute value of actual temperature

*Pt500 is 5 times, Pt1000 is 10 times of the numbers

Data on Electrical Characteristics

Item	**Test Condition**	**Characteristic Value**
Self Heating	Measuring Current: 0.5, 1mA	Appendix Table 1
Response time	Still Air and Stirred Water	Appendix Table 2
Insulation Resistance*	DC100V	Over 100MΩ

*Insulation resistance value is to measure insulation resistance of the protection layer.

Appendix Table 1 Self-Heating Specification

Model	Condition	Self-Heating/ deg. C		
		0.5mA	1mA	(2mA)*
CRZ1632R-100	Still Air without MgO		0.10	0.49
	Still Air with MgO		0	0.08
CRZ2005R-100	Still Air without MgO		0.08	0.47
	Still Air with MgO		0	0.07
CRZ2005R-1000	Still Air without MgO	0.23	1.08	4.46
	Still Air with MgO	0	0.14	0.71

*Comparison of how different current values affect on self heating using sensors filled with MgO powder in the protection tubes and exposed elements without protection tubes.

*2mA for 100Ω and 1mA for 1000Ω are out of standard.

Appendix Table 2 Response Time

Model	Response Time (Time constant: :63.2%)/sec	
	Still Air	Stirred Water
CRZ1632R	4.3	0.3
CRZ2005R	4.8	0.4

Data on Reliability Test

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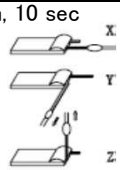
Item	Test Condition	Characteristic Value
Stability	Room temp, 1000 hour	△R0 < ±0.02℃
Heat Resistibility	200℃, 1000 hour 400℃, 1000 hour	△R0 < ±0.05℃ (200℃) △R0 < ±0.10℃ (400℃)
Cold Resistibility	−70℃, 100 hour	△R0 < ±0.05℃
Heat Cycle	Low temp side: −40℃ High temp side: 120℃ Heat Cycle: 100 times	△R0 < ±0.05℃
Thermal Shock	Low temp side: 0℃ High temp side: 200, 400℃ Heat Cycle: 10 times	△R0 < ±0.05℃(200℃) △R0 < ±0.10℃(400℃)
Connection Reinforcement Strength	Pull Force, Each Direction, 10 sec X Axial Direction: 2.5N Y Axial Direction: 1.0N Z Axial Direction: 1.0N 	△R0 < ±0.05℃
Vibration Resistibility	Fixed on a rigid hardware and applied to the vibration condition as below. Frequency: 10 Hz to 150 Hz Acceleration: 20m/s² Period 2 minutes Pull Cycle: 10 times	△R0 < ±0.05℃
Physical Shock Resistibility	Continuously Dropped on a iron plate above 250mm for 10 times.	△R0 < ±0.05℃

Data on Chemical Contents

	Ratio by Weight(Wt%)					
	Part name					
	Substrate	Thin Film Circuit	Protection Layer	Connection Reinforcement	Lead wire	Weight
CRZ2005R	57.4%	0.6%	1.8%	14.6%	25.6%	32.2mg
CRZ1632R	45.5%	0.5%	1.9%	13.3%	38.8%	21.1mg

	Content of restricted materials in RoHS(ppm) ND= not detected									
	Heavy Metal				PBB	PBDE	DEHP	BBP	DBP	DIBP
	Cadmium and the compound	Lead and the compound	Mercury and the compound	Hexavalent Chromium						
CRZ2005R	ND	＜5500	ND	ND	ND	ND	ND	ND	ND	ND
CRZ1632R	ND	＜6000	ND	ND	ND	ND	ND	ND	ND	ND

On European RoHS directive, lead contained products shall be an exception under Annex Ⅲ、 7(c)-1(2011/65/EU) and ammended Annex Ⅱ(2015/863/EU).

HAYASHI DENKO CO.,LTD.

Notification

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○Apply the elements under the standard measuring currents, temperature range, and other capacities.
In case the applications are over the capacity and/or are wrong, we do not take the responsibility.
When those are used under unusual environments, for example as below from (1) to (8), those might affect on the performance and malfunction. We recommend you to thoroughly check the performance and reliability under your own environment.

(1) Application in liquid such as water, oil, chemical solution, organic solvent.
(2) Application directly exposed sunlight, outside atmosphere, and dust.
(3) Application under high-temperature and high-humidity, salt air, corrosive gas.
(4) Application under strong static electricity, surge current, noise, and electromagnetic wave.
(5) Application near flammable materials.
(6) Application directly adhering to an object with resin, sealed with resin, and coated with resin.
In those cases, due to bond penetration and different ratios of heat expansion, the characteristics and products can be damaged.
(7) In case that wash-free solder is used and/or water or a water-soluble cleaning liquid is used for flux cleaning.
(8) Application under the dew condensation environment.

○ CRZ elements should be stored and used only in dry environment.

○ CRZ elements are resistance temperature detector elements for industrial use. Do not use the elements as heaters by applying electric current.

○ The actual resistance values printed on bags are measured at the point of 3mm from the end of Ni lead wires. If the lead wires were shortened and/ or spot welded at points closer to the body, the resistance values would be detected lower than the printed values.

○ Do not apply strong impact and/or stress on the elements and lead wires. The protection layer and the body can be cracked, and the lead wires and the reinforcement at the base of lead wires can be damaged.

○ Pay attention in order not to expose over the capacity range of temperature in case of connecting lead wires and extension lead wires by silver brazing or somehow like that.

○ In order to keep CRZ elements from physical and chemical damages and dew condensation, we recommend the construction of probes as below.
First, to use well-cleaned protection tubes such as stainless steel to keep long life and durability.
Second, to fill Magnesium Oxide(MgO) powder in protection tubes for fast response and vibration resistance.
Third, to seal the end of the protection tubes by epoxy adhesive to prevent moisture and water invasion.

○ The elements are supposed to be applied to ordinary electric devices. When you consider applications for devices for nuclear, space development, and medical purposes that special quality and responsibility are required, we request to have our consult in advance.

○ We might change a part or parts of the contents without a notice due to production improvements. Please confirm the specification when order and use.

○ The specification is written on January 2018.

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