

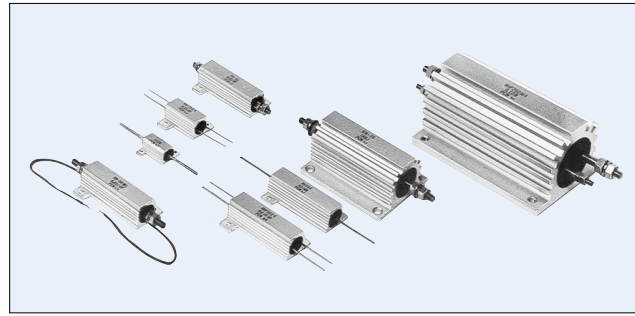
PRECISION TYPE METAL CLAD RESISTORS

RH / RHF

High power and precision metal clad resistor molded with heatproof epoxy resin

Features:

- Ideal for precision current sensing
 *We recommend a 4-terminal type that suppresses effects from the terminals.
- Resistive materials used that generate less thermo electro-motive force.
- Excellence in moisture resistance, chemical resistance, dielectric strength and insulation
- Variety in terminal options available
- Non-inductive winding(RHF) available for better frequency characteristics



4-Terminal Type

Type		Wattage Rating(W)		Terminal	Resistance Range (Ω)						Maximum Current Running (A) *2	Maximum Working (V) *3	Dielectric Strength (V)	
Inductive	Non-Inductive	Chassis Mounted *1	Free Air		Resistance Tolerance / Minimum Resistance (Ω)									
					±1% (F)	±0.5% (D)	±0.1% (B)	±0.05% (A)	±0.02% (Q)	±0.01% (T)				Maximum Resistance (Ω)
RH-10E4	RHF10E4	4	2	4	0.02~	0.02~	0.05~	0.1~	0.2~	20~	300K	14	300	AC1000
RH-25E4	RHF25E4	6	3	4	0.01~	0.01~	0.03~	0.05~	0.1~	10~	600K	24	400	AC1000
RH-50E4	RHF50E4	10	4	4	0.01~	0.01~	0.02~	0.05~	0.1~	10~	3M	25	1300	AC2000
RH-50ML	RHF50ML	10	4	4	0.001~	0.001~	0.001~	0.02~	0.05~	5~	2M	100	1300	AC2000
RH-75ML	RHF75ML	20	8	4	0.001~	0.001~	0.001~	0.005~	0.01~	1~	150K	140	1300	AC4500
RH-100ML	RHF100ML	30	12	4	0.001~	0.001~	0.001~	0.005~	0.01~	1~	350K	170	1400	AC4500
RH-100M4	RHF100M4	30	12	4	0.001~	0.001~	0.001~	0.005~	0.01~	—	0.5	170	1400	AC4500
RH-250ML	RHF250ML	50	20	4	0.001~	0.001~	0.001~	0.005~	0.01~	1~	600K	200	1700	AC4500
RH-250M4	RHF250M4	50	20	4	0.001~	0.001~	0.001~	0.005~	0.01~	—	0.5	200	1700	AC4500

Terminal Configuration (4-Terminal Type)

E4	ML	M4
<p>One of the two terminals(lead wire/Cu) on one side can be used as a current terminal and the other as a voltage terminal (for detection). There is no electrical polarity on both sides. (See diagram of internal circuit of 4-Terminal type.)</p>	<p>The shaft with the screw is the current terminal. A 0.35q Teflon coated wire is a voltage terminal for detection. There is no electrical polarity on both sides. (See diagram of internal circuit of 4-Terminal type.)</p>	<p>The shaft with the M6 screw is the current terminal. The M4 screw is the voltage terminal for detection. There is no electrical polarity on both sides. (See diagram of internal circuit of 4-Terminal type.)</p>

Ambient Temp. Derating Curve

2-Terminal Type

Type		Wattage Rating(W)		Terminal	Resistance Range (Ω)						Maximum Current Running (A) *2	Maximum Working (V) *3	Dielectric Strength (V)	
Inductive	Non-Inductive	Chassis Mounted *1	Free Air		Resistance Tolerance / Minimum Resistance (Ω)									
					±1% (F)	±0.5% (D)	±0.1% (B)	±0.05% (A)	±0.02% (Q)	±0.01% (T)				Maximum Resistance (Ω)
RH-5E	RHF5E	2	1	2	0.02~	0.1~	1~	2~	20~	30~	150K	10	300	AC500
RH-10E	RHF10E	4	2	2	0.02~	0.1~	0.3~	1~	10~	20~	300K	14	300	AC1000
RH-25E	RHF25E	6	3	2	0.02~	0.1~	0.5~	1~	10~	20~	600K	17	400	AC1000
RH-50E	RHF50E	10	4	2	0.02~	0.1~	0.5~	1~	10~	20~	3M	22	1,300	AC2000
RH-50M	RHF50M	10	4	2	0.01~	0.05~	0.3~	0.5~	—	—	2M	31	1,300	AC2000
RH-75M	RHF75M	20	8	2	0.01~	0.05~	0.3~	0.5~	10~	20~	150K	44	1,300	AC4500
RH-100M	RHF100M	30	12	2	0.01~	0.05~	0.1~	0.3~	10~	20~	350K	50	1,400	AC4500
RH-250M	RHF250M	50	20	2	0.01~	0.05~	0.1~	0.3~	10~	20~	600K	70	1,700	AC4500

Terminal Configuration (2-Terminal Type)

E	M
<p>Since the 2-terminal structure includes the resistance component of the terminals(lead wire/Cu), we recommend the 4-terminal type when using a low resistance value. For details, please refer to the Q&A "About 4-terminal resistors" on our website.</p>	<p>Since the 2-terminal structure includes the resistance component of the terminal (brass), we recommend the 4-terminal type when using a low resistance value. For details, please refer to the Q&A "About 4-terminal resistors" on our website.</p>

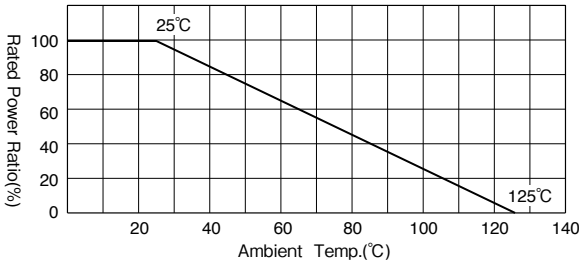
*1 When being mounting on a test chassis
 *2 Please note that the maximum allowable current is the smaller one of the following values.
 Values calculated by the formula "Rated current = Rated voltage ÷ Nominal resistance value" or
 "Maximum Current Running" (continuous)specified in the table of the data sheet.
 *3 The smaller one among the two values below needs to be dealt as maximum working voltage.
 Rated voltage = √ (Rated power x Nominal resistance value) or
 the maximum working voltage specified in the table of the data sheet.

Internal Circuit of 4-Terminal type.



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Ambient Temp. Derating Curve



Operating Temp. Range $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$

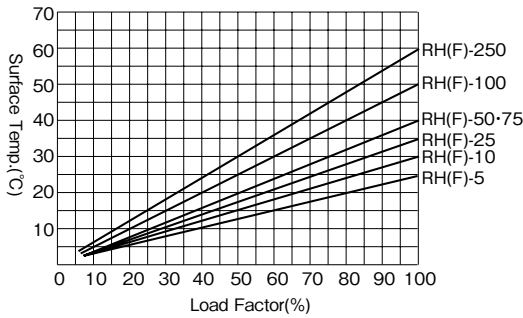
Temp. Coefficient

(Standard Temp: 25°C Test Temp: 0°C, 100°C)

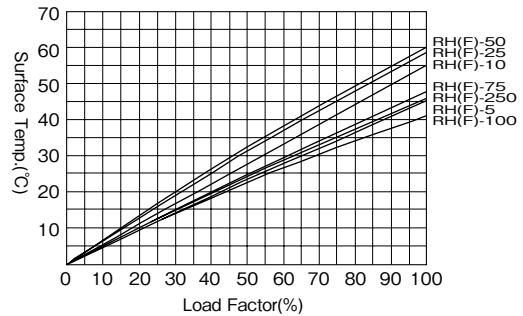
Resistance	Temp. Coefficient (ppm/°C)	
	2-Terminal Type	4-Terminal Type
$1\Omega \leq R$	± 30	± 30
$0.1\Omega \leq R < 1\Omega$	± 50	± 30
$0.05\Omega \leq R < 0.1\Omega$	± 50	± 30
$0.01\Omega \leq R < 0.05\Omega$	± 100	± 50
$0.005\Omega \leq R < 0.01\Omega$	—	± 50
$0.001\Omega \leq R < 0.005\Omega$	—	± 50

Due to the internal structure of this product, the internal thermal resistance varies depending on its resistance value. So if you need to know the temperature of the internal resistance element, please contact our sales department.

Surface Temp. Versus Load Factor(on chassis)

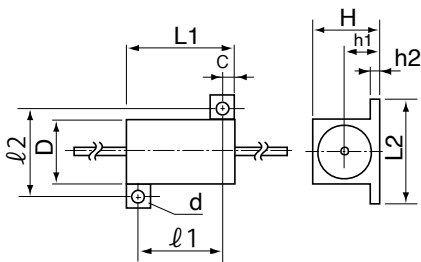


Surface Temp. Versus Load Factor(Free Air)

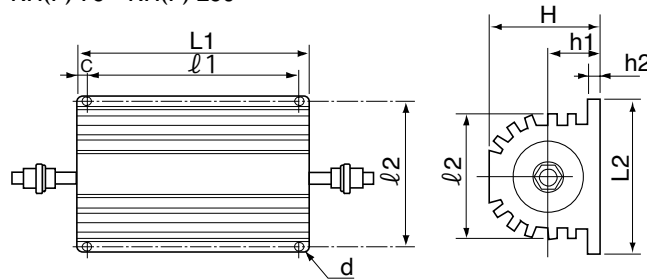


Dimensions (mm)

RH(F)-5~RH(F)-50



RH(F)-75~RH(F)-250



Type	Dimensions (mm)										Weight (g)
	L1±1	L2±0.8	ℓ1±0.8	ℓ2±0.8	D±1	H±0.8	d±0.3	c±0.8	h1±1	h2±0.5	
RH-5E	15.3	16.4	11.3	12.5	8.5	8	2.3	2	4	1.6	3
RH-10□	19	20	14.3	15.9	10.8	10	2.4	2.4	5.3	2.4	7
RH-25□	27	28	18.3	19.8	13.5	14	3.2	4.4	7.1	2.4	15
RH-50□	49.2	29.2	39.7	21.4	15.1	16	3.2	4.8	8	2.5	33
RH-75□	66	52	56	42	32	33	4.8	5	16	3.2	200
RH-100□	88.9	71.4	69.9	57.2	46	44.5	4.8	9.5	19.5	4.8	450
RH-250□	114.3	76.2	98.4	63.5	54	55.6	4.8	7.9	25.4	6.4	800

Type	a±2	Screw-cutting length of "a" (Dimension from shaft tip)	b	P±1
RH-5E	—	—	—	—
RH-10□	—	—	—	5
RH-25□	—	—	—	6
RH-50□	13	11~13	M4	7
RH-75□	22	14~17	M5	—
RH-100□	25	18~21	M6	—
RH-250□	31	19~26	M6	—

Test Chassis Dimension(mm)

Converted with thermal resistance

RH(F)-5 · 10 152 x 102 x 51 x 1t(Converted with thermal resistance: 3°C/W)

RH(F)-25 · 50 178 x 127 x 51 x 1t(Converted with thermal resistance: 2.8°C/W)

RH(F)-75~250 305 x 305 x 3t(Converted with thermal resistance: 1°C/W)



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Performance

Parameters	Test Conditions	Specification
Short Time Overload	2 x Wattage Rating 5 sec	±0.1%
Heat Resistance	Room Temp. →150°C 2Hr	±0.1%
Dielectric Strength	See P/N Table on Page 1.	±0.02%
Insulation Resistance	DC500V	1000MΩ MIN
Moisture Resistance (Steady Condition)	Temp. +40°C, RH 90 to 95%, 1/10 x Wattage Rating (1.5Hr ON, 0.5Hr OFF) Repeat 500Hr	±0.05% Insulation Resistance 100MΩ Min.
Vibration	10Hz - 55Hz - 10Hz(1min) Vertical and Horizontal direction for 2Hr each	±0.1%
Load Life (Rated Load)	Room Temp.(Chassis mounted) Rated Voltage 1.5Hr ON, 0.5Hr OFF, Repeat 2000Hr	±0.2%

How to order

*

RH-50ML	1 mΩ	B
Type	Resistance	Tolerance

※ RHF for non-inductive wire winding

Order for a single piece accepted for any resistance value within the standard resistance range

Precautions

Frequency Characteristics of Non-inductive Wire Winding
 The internal structure of this product varies significantly depending on the part number and resistance value. Therefore, please note that the frequency characteristics are also different. Please inquire about the frequency characteristics in advance if you will use this product with other than direct current.

Note: When ordering terminal type E, please specify the resistance measurement point.

If no indication is made, the measurement point will be 10 mm from the base of the body.

Precautions

1. This RH/RHF series is designed on the assumption of being mounted on chassis. So please follow the following precautions.

- (1) Use a chassis with good adhesiveness and no unevenness for the resistor mounting area.
- (2) Apply a good heat-conducting substance evenly such as heat dissipation grease between the resistor mounting surface of the chassis and the resistor.
- (3) Use crimp terminals to connect wire to M, ML, and M4 type screw terminals of the RH(F)50, RH(F)75, RH(F)100 and RH(F)250 series and tighten the nuts with the torque specified in the following table.

Type	Current Terminal		Voltage Terminal		
	Torque to tighten	Terminal Materials		Torque to tighten	Terminal Materials
		Resistance < 0.1 Ω	0.1 Ω ≤ Resistance		
RH (F) 50M	0.60~0.75N · m	Brass, Cd-less Nickel plate	Brass, Cd-less Nickel plate	—	—
RH (F) 50ML				—	Lead wire/Cu/Sn plate
RH (F) 75M	1.18~1.57N · m		SUS304(stainless) without plating	—	—
RH (F) 75ML				—	Lead wire/Cu/Sn plate
RH (F) 100M				—	—
RH (F) 100ML				—	Lead wire/Cu/Sn plate
RH (F) 100M4	1.96~2.35N · m		Brass, Cd-less Nickel plate	0.60~0.75N · m	Brass, Cd-less Nickel plate
RH (F) 250M				—	—
RH (F) 250ML				—	Lead wire/Cu/Sn plate
RH (F) 250M4				0.60~0.75N · m	Brass, Cd-less Nickel plate

Since brass is used for the shaft of the terminal, there is a risk of break if tightened with a torque greater than the specified value.

2. Note for connecting terminals

When using the resistor in an environment where vibration is generated, provide a relay terminal so that the vibration is not directly transmitted to the terminal via the connection cable.

This is just to avoid an unstable resistance value.

Standard Resistance (Stock)

RHF50ML 1mΩB	RHF50ML 0.1ΩQ	RHF75ML 0.05ΩQ	RHF250M4 0.05ΩQ
RHF50ML 5mΩD	RHF50ML 0.5ΩQ	RHF75ML 0.1ΩQ	RHF250M4 0.1ΩQ
RHF50ML 0.01ΩB	RHF50ML 1ΩQ		
RHF50ML 0.05ΩQ		RHF100M4 0.1ΩQ	

F : ±1% D : ±0.5% B : ±0.1% A : ±0.05% Q : ±0.02%

