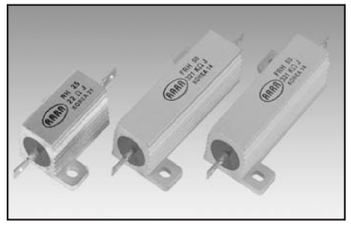
RH, FRH

RoHS COMPLIANT



- Aluminum housed
- Standard(RH) or non-inductive(RHN) winding
- Cement molding
- 100% RoHS compliant
- Complete welded construction
- Mounts on chassis to utilize heat sink effect
- High stability at conventional power ratings

GENERAL SPECIFICATIONS

Model	Element Type	Power Rating		Resistance Range		Temperature Coefficient					Resistance Tolerance (%)	Minimum Ohmic Value
						-15℃, 25℃, 105℃	Measuring Temp; -55℃, 25℃, 250℃					
		With Heat Sink	In Free Air	Inductive	Non-Inductive	±200 [ppm/℃]	±200 [ppm/℃]	±100 [ppm/℃]	±50 [ppm/℃]	±30 [ppm/℃]		
RH 25C	Wire Wound	20W	8W	0.022Ω~ 25KΩ	0.1Ω~ 10KΩ	-	0.022Ω~ 0.09Ω	0.1Ω~ 0.976Ω	1Ω~ 19.6Ω	20Ω~	B [±0.1] C [±0.25] D [±0.5] F [±1] G [±2] J [±5]	1Ω~ 0.4Ω~ 0.2Ω~ 0.1Ω~ 0.05Ω~ 0.02Ω~
RH 50C	Wire Wound	*30W *50W	10W	0.048Ω~ 50KΩ	0.2Ω~ 20KΩ	-	0.048Ω~ 0.09Ω	0.1Ω~ 0.976Ω	1Ω~ 19.6Ω	20Ω~		
FRH 25C	Thick Film	15W	5W	-	2Ω~ 2MΩ	2Ω~ 2MΩ	-	-	-	-	F [±1] G [±2] J [±5] K [±10]	2Ω~
FRH 50C	Thick Film	25W	8W	-	2Ω~ 2MΩ	2Ω~ 2MΩ	-	-	-	-		

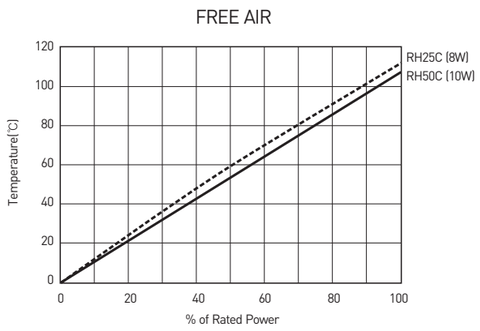
*30W on heat sink(178×127×51×1tmm), 50W on heat sink(305×305×2tmm)

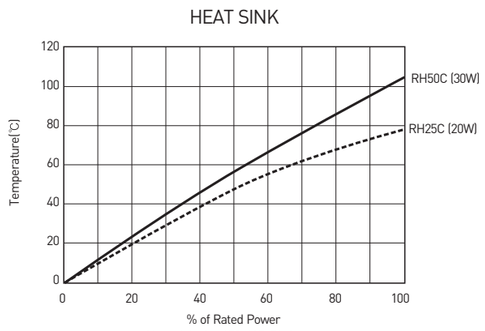
CHARACTERISTICS

Values in [ ] mean change in Ω after test

Test	RH	FRH	Condition
Temperature Range			-55℃ ~ 250℃
Insulation Resistance			10GΩ minimum (dry)
Dielectric Withstanding Voltage	±[0.2%+0.05Ω]	±[0.5%+0.05Ω]	AC 2000V: maximum. leakage current; 2mA
Short Time Overload	±[0.5%+0.05Ω]	±[1%+0.05Ω]	FRH: 2×Power rating 5 sec., RH: 5×Power rating 5 sec.
Load Life	±[1%+0.05Ω]	±[2%+0.05Ω]	Power rating 1.5 hours on, 30 minutes off, 1000 hours
Thermal Shock	±[0.5%+0.05Ω]	±[1%+0.05Ω]	Power rating 30 minutes, -55℃ 15~30 minutes

SURFACE TEMPERATURE INCREASE VERSUS POWER LOAD

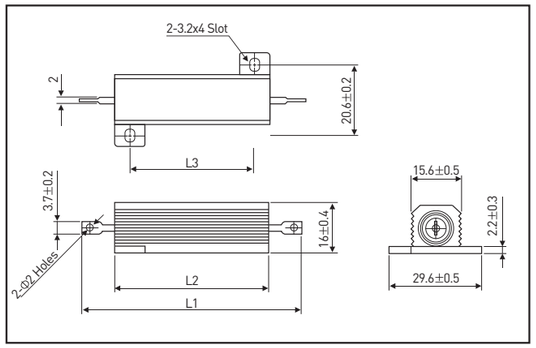




RH, FRH

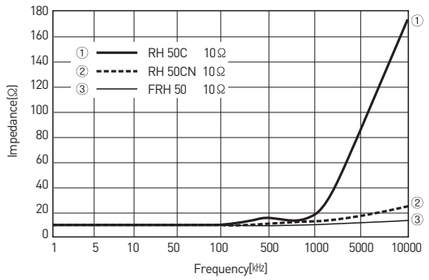
RoHS COMPLIANT

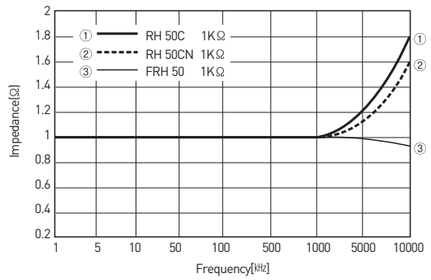
DIMENSIONS [mm]



Model	Dimensions(mm)			Weight [g]
	L1±1.5	L2±0.5	L3±0.2	
RH 25C	49.4	27.1	18.3	16.5
RH 50C	70.8	49.3	39.7	35
FRH 25C	49.4	27.1	18.3	16.5
FRH 50C	70.8	49.3	39.7	35

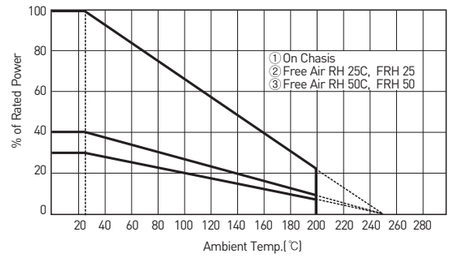
FREQUENCY CHARACTERISTIC CURVES



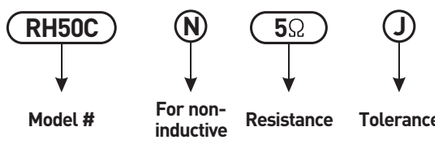


DERATING CURVES

RH25, 50C and FRH resistors have an operating temperature range of -55℃ to 250℃.
Derating is required for reduced chassis mounting area and for high ambient temperatures.
The following curves apply to operation of unmounted resistors
Heat sink size: 178×127×51×1 mm
1. On Chassis
2. Free Air RH 25C, FRH 25C
3. Free Air RH 50C, FRH 50C



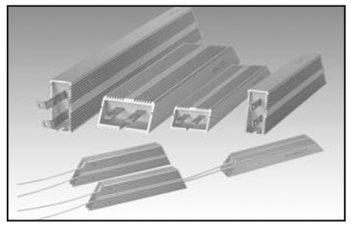
ORDERING PROCEDURE EXAMPLE



If you require more detailed technical information please contact the RARA design team. design1@raraohm.com

IRH, ULH, IRV, ULV

RoHS COMPLIANT | IP 65



The IRV(V=Vertical) & IRH(H=Horizontal) models are our standard wire wound, metal-clad resistors. The ULV and ULH models are UL approved versions of the IRV and IRH. These models have an extruded aluminum housing providing strong and rugged protection. Options include flying leads or tab terminals, inductive or non-inductive windings. The most common applications for theses models are: Motor drives, braking and snubber applications and power sources for industrial equipment.

GENERAL SPECIFICATIONS

Model	Rated Power		Resistance Range[Ω]				Resistance Tolerance
			Inductive		Non-Inductive		
	On Heatsink	In Free Air	Tab Terminals	Flying Leads	Tab Terminals	Flying Leads	
IRV / IRH 60	60W	50W	0.1 ~ 400		0.1 ~ 180		IRV / IRH D [±0.5%] F [±1.0%] G [±2.0%] J [±5.0%] K [±10%] ULV / ULH G [±2.0%] J [±5.0%] K [±10%]
ULV / ULH 60			0.1 ~ 375	0.1 ~ 400	0.1 ~ 180		
IRV / IRH 80	80W	64W	0.1 ~ 910		0.1 ~ 110		
ULV / ULH 80			0.1 ~ 281	0.1 ~ 910	0.1 ~ 110		
IRV / IRH 100	100W	80W	0.1 ~ 1.1K		0.1 ~ 240		
ULV / ULH 100			0.1 ~ 225	0.1 ~ 1.1K	0.1 ~ 225	0.1 ~ 240	
IRV / IRH 120	120W	96W	0.1 ~ 1.3K		0.1 ~ 300		
ULV / ULH 120			0.1 ~ 187	0.1 ~ 1.3K	0.1 ~ 187	0.1 ~ 300	
IRV / IRH 150	150W	120W	0.1 ~ 1.6K		0.1 ~ 390		
ULV / ULH 150			0.1 ~ 150	0.1 ~ 1.6K	0.1 ~ 150	0.1 ~ 390	
IRV / IRH 200	200W	140W	0.1 ~ 2.2K		0.1 ~ 1K		
ULV / ULH 200			0.1 ~ 450	0.1 ~ 2.2K	0.1 ~ 450	0.1 ~ 1K	
IRV / IRH 300	300W	210W	0.1 ~ 2.7K		0.1 ~ 1.5K		
ULV / ULH 300			0.1 ~ 300	0.1 ~ 2.7K	0.1 ~ 300	0.1 ~ 1.5K	
IRV / IRH 400	400W	240W	0.1 ~ 4.3K		0.1 ~ 2.2K		
ULV / ULH 400			0.1 ~ 225	0.1 ~ 4.3K	0.1 ~ 225	0.1 ~ 2.2K	
IRV / IRH 500	500W	300W	0.1 ~ 6.8K		0.1 ~ 3K		
ULV / ULH 500			0.1 ~ 180	0.1 ~ 6.8K	0.1 ~ 180	0.1 ~ 3K	

Also available in extended ohmic ranges of 1mΩ to 750kΩ

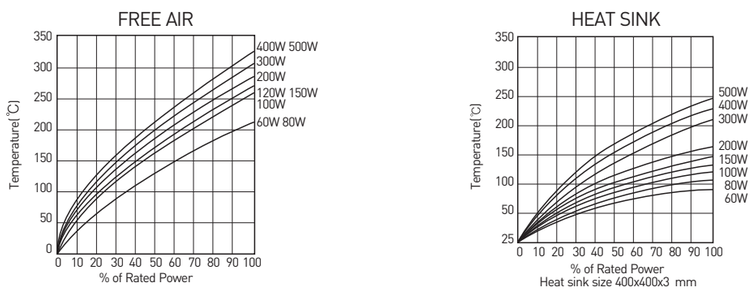
CHARACTERISTICS

Values in [ ] mean change in Ω after test

Temperature Range		-55℃ ~ +200℃
Insulation Resistance		20MΩ minimum
Dielectric Withstanding Voltage	IRV / IRH	Available options: AC1500V, 3500V, 4500V, 5400V: maximum. leakage current: 2mA
	ULV / ULH	[1000V+(Voltage rating × 2)] for 1 minute
Temp. Coefficient		±260ppm/℃ maximum
Short Time Overload	±[2%+0.05Ω]	60W: 5×Power rating 5sec., 80~500W: 10×Power rating 5 sec.
Moisture Resistance	±[3%+0.05Ω]	40℃, 95℃ RH, DC100V case to terminal, 500 hours
Thermal Shock	±[2%+0.05Ω]	Power rating 30 minutes, -25℃ 15 minutes
Vibration	±[1%+0.05Ω]	10Hz~55Hz~10Hz (1 minute), 2 hours each direction
Moisture Load Life	±[3%+0.05Ω]	40℃, 95%RH, 0.1×Power rating 1.5 hours on, 30 minutes off, 500 hours
Load Life	±[5%+0.05Ω]	Power rating 1.5 hours on, 30 minutes off, 500 hours

*Note ULV / ULH dielectric strength options of AC 1500V, 3500V, 4500V, 5400V are also available.
Optional dielectric strength must be higher than standard (calculated by formula)

SURFACE TEMPERATURE INCREASE VERSUS POWER LOAD

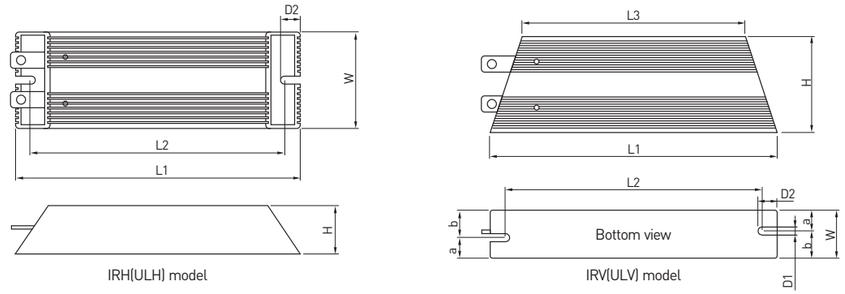


A mid-point bracket is required for 150W, 300W, 400W, 500W models to ensure sufficient contact with the heat sink.

IRH, ULH, IRV, ULV

RoHS COMPLIANT | IP 65

DIMENSIONS [mm]



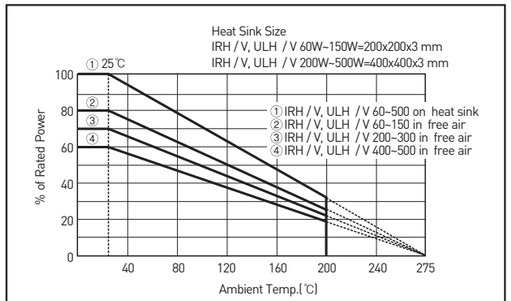
Model	Dimensions(mm)									Weight(g)	
	L1±2	L2±2	L3±2	W±0.5	H±0.5	D1±0.3	D2±0.5	a±0.5	b±0.5	IRH / ULH	IRV / ULV
IRH / V 60	100	87	60	41(H) 22(V)	22(H) 41(V)	4.3	8.65	10	12	110	113
IRH / V 80	150	137	110	41(H) 22(V)	22(H) 41(V)	4.3	8.65	10	12	195	189
IRH / V 100	165	152	125	41(H) 22(V)	22(H) 41(V)	4.3	8.65	10	12	216	215
IRH / V 120	182	169	142	41(H) 22(V)	22(H) 41(V)	4.3	8.65	10	12	245	241
IRH / V 150	210	197	170	41(H) 22(V)	22(H) 41(V)	4.3	8.65	10	12	283	290
IRH / V 200	165	146	125	60(H) 30(V)	30(H) 60(V)	5.3	12	13	17	485	447
IRH / V 300	215	196	175	60(H) 30(V)	30(H) 60(V)	5.3	12	13	17	600	600
IRH / V 400	265	246	225	60(H) 30(V)	30(H) 60(V)	5.3	12	13	17	770	780
IRH / V 500	335	316	295	60(H) 30(V)	30(H) 60(V)	5.3	12	13	17	990	980

FLYING LEADS

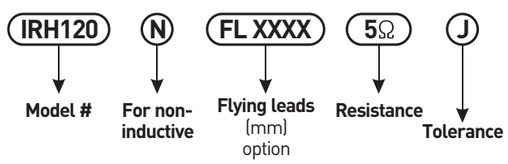
Model	2㎟	1.25㎟	UL3512 AWG10	UL3512 AWG14
IRH / V 60 ~ 150	0.1Ω ~ 0.99Ω	1Ω~	×	×
IRH / V 200 ~ 500	0.38Ω ~	×	0.1Ω ~ 0.37Ω	×
ULH / V 60 ~ 120	×	×	×	0.1Ω ~
ULH / V 150	×	×	×	0.11Ω ~
ULH / V 200	×	×	0.1Ω ~ 0.15Ω	0.16Ω ~
ULH / V 300	×	×	0.1Ω ~ 0.22Ω	0.23Ω ~
ULH / V 400	×	×	0.1Ω ~ 0.30Ω	0.31Ω ~
ULH / V 500	×	×	0.1Ω ~ 0.37Ω	0.38Ω ~

*Option: Flying leads options of UL3135, UL3071, UL3172 are also available

DERATING CURVES



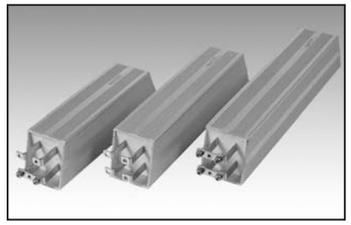
ORDERING PROCEDURE EXAMPLE



Thermostat options are available for these models: Internal and discreet connection. Please ask RARA for more info on this.

IRV, ULV 600~1200

RoHS COMPLIANT | IP 65



The IRV & ULV 600~1200(V=Vertical) models are our standard higher power wire wound, metal-clad resistors. The ULV 600~1200 is the UL approved version of the IRV600~1200 models. These models have an extruded aluminum housing providing strong and rugged protection. Options include flying leads or tab terminals, inductive or non-inductive windings. The most common applications for theses models are: Motor drives, braking and snubber applications and power sources for industrial equipment.

GENERAL SPECIFICATIONS

Model	Rated Power		Resistance Range[Ω]						Resistance Tolerance (%)
			Inductive			Non-Inductive			
	On Heatsink	In Free Air	Tab TP *	Tab TS *	Flying Leads	Tab TP *	Tab TS *	Flying Leads	
IRV 600	600W	330W	0.1 ~ 9	9.1 ~ 94	0.1 ~ 94	0.1 ~ 5.3	5.4 ~ 21.2	0.1 ~ 21.2	IRV / IRH D (±0.5] F (±1.0] G (±2.0] J (±5.0] K (±10] ULV G (±2.)] J (±5.0] K (±10]
ULV 600			0.1 ~ 9	9.1 ~ 94	0.11 ~ 94	0.1 ~ 5.3	5.4 ~ 21.2	0.1 ~ 21.2	
IRV 800	800W	360W	0.1 ~ 11	11.1 ~ 112	0.1 ~ 112	0.1 ~ 7.2	7.2 ~ 28.8	0.1 ~ 28.8	
ULV 800			0.1 ~ 11	11.1 ~ 112	0.14 ~ 112	0.1 ~ 7.2	7.3 ~ 28.8	0.14 ~ 28.8	
IRV 1000	1000W	400W	0.1 ~ 18	18.1 ~ 140	0.1 ~ 140	0.1 ~ 9	9.1 ~ 36	0.1 ~ 36	
ULV 1000			0.1 ~ 18	18.1 ~ 90	0.17 ~ 140	0.1 ~ 9	9.1 ~ 36	0.17 ~ 36	
IRV 1200	1200W	480W	0.1 ~ 25	25.1 ~ 160	0.1 ~ 160	0.1 ~ 12	12.1 ~ 48	0.1 ~ 48	
ULV 1200			0.1 ~ 25	25.1 ~ 175	0.21 ~ 160	0.1 ~ 12	12.1 ~ 48	0.21 ~ 48	

* Note: Tab TP = Terminal Parallel Connection, Tab TS = Terminal Serial Connection

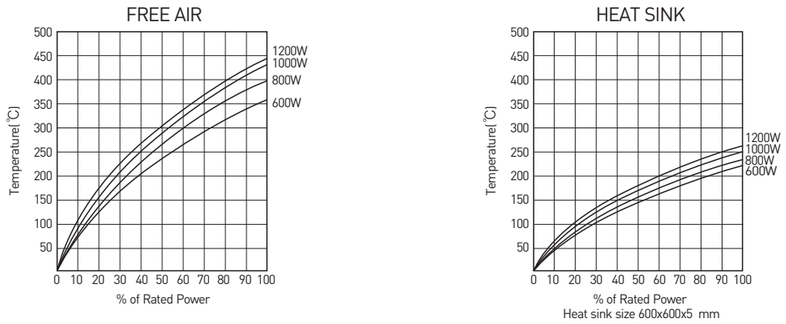
CHARACTERISTICS

Values in [ ] mean change in Ω after test

Temperature Range		-55℃ ~ +200℃
Insulation Resistance		20MΩ minimum
Dielectric Withstanding Voltage	IRV	Available options: AC1500V, 3500V, 4500V, 5400V: maximum leakage current: 2mA
	ULV	* See note [1000V+(Voltage ratingx2)] for 1 minute
Temp. Coefficient		±260ppm/℃ maximum
Short Time Overload	±[2%+0.05Ω]	10 x Power rating 5 sec.
Moisture Resistance	±[3%+0.05Ω]	40℃, 95% RH, DC100V case to terminal, 500 hours
Thermal Shock	±[2%+0.05Ω]	Power rating 30 minutes, -25℃ 15 minutes
Vibration	±[1%+0.05Ω]	10Hz~55Hz~10Hz (1 minute), 2 hours each direction
Moisture Load Life	±[3%+0.05Ω]	40℃, 95%RH, 0.1 x Power rating 1.5 hours on, 30 minutes off, 500 hours
Load Life	±[5%+0.05Ω]	Power rating 1.5 hours on, 30 minutes off, 500 hours

*Note ULV / ULH dielectric withstanding voltage options of AC 1500V, 3500V, 4500V, 5400V are also available.
Optional dielectric withstanding voltage must be higher than standard(calculated by formula)

SURFACE TEMPERATURE INCREASE VERSUS POWER LOAD

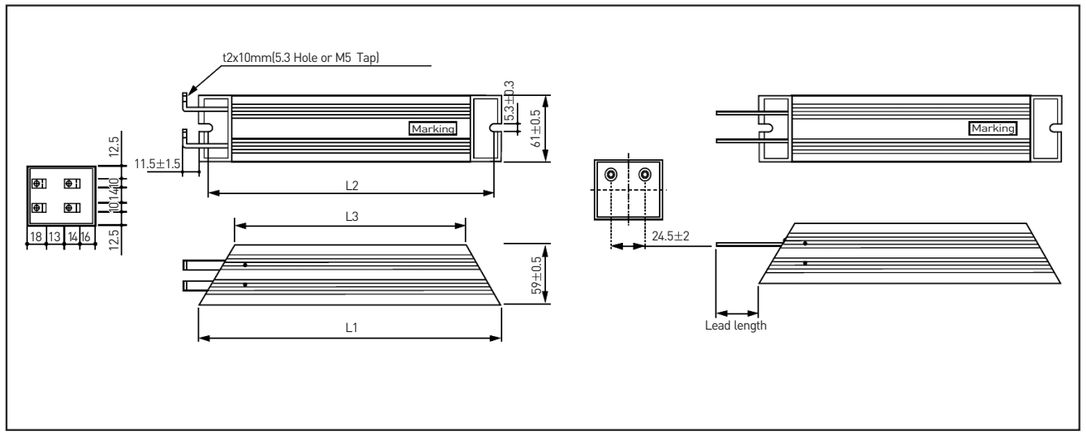


A mid-point bracket is required for 800 ~ 1200W models to ensure sufficient contact with the heat sink.

IRV, ULV 600~1200

RoHS COMPLIANT | IP 65

DIMENSIONS [mm]



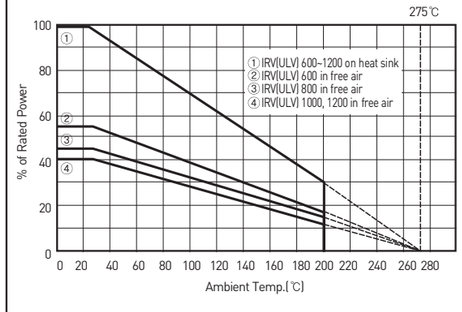
Model	Dimensions(mm)			Weight(g)
	L1±2	L2±2	L3±2	
ULV / IRV 600	235	216	195	1165
ULV / IRV 800	285	266	246	1500
ULV / IRV 1000	335	316	295	1835
ULV / IRV 1200	405	386	365	2304

FLYING LEADS

Model	8 ㎟	5.5 ㎟	UL3512 AWG10
IRV 600 ~1200	0.1Ω ~ 0.99Ω	0.1Ω ~	X
ULV 600	X	X	0.11Ω ~
ULV 800	X	X	0.14Ω ~
ULV 1000	X	X	0.17Ω ~
ULV 1200	X	X	0.21Ω ~

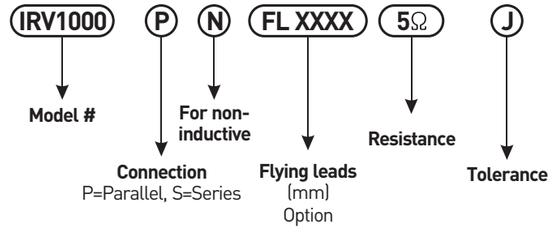
*Option: Flying leads options of UL3135, UL3139, UL3071, UL3172 are also available

DERATING CURVES



Heat sink size: 600x600x5 mm

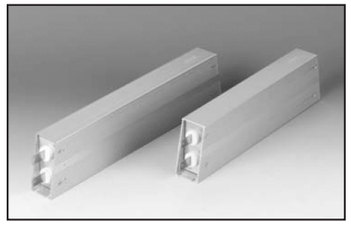
ORDERING PROCEDURE EXAMPLE



Thermostat options are available for these models: Internal and discreet connection. Please ask RARA for more info on this.

IRV, ULV 1600~2800

RoHS COMPLIANT



The IRV(V=vertical) models are metal-clad wire-wound high-power resistors designed for industrial and other applications. Our extruded aluminum housing provides rugged and strong protection. These models are available with Tab terminals. The most common applications for these models are: Motor drives, braking and snubber applications and power sources for industrial equipment.

GENERAL SPECIFICATIONS

Model	Rated Power	Resistance Range[Ω]		Resistance Tolerance (%)
	In Free Air	Inductive	Non-Inductive	
IRV / ULV 1600	570W	1.5 ~ 88	0.3 ~ 23	F [±1] J [±5] K [±10]
IRV / ULV 2000	650W	2.0 ~113	0.45 ~ 30.5	
IRV / ULV 2400	720W	2.5 ~ 144	0.6 ~ 37	
IRV / ULV 2800	750W	3.0 ~ 135	0.7 ~ 33.5	

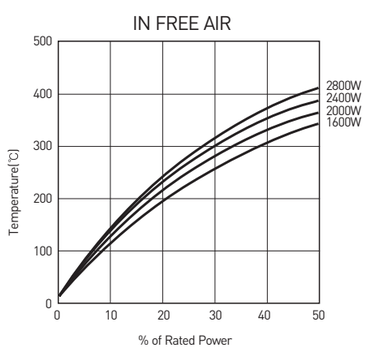
Also ohmic ranges of IRV 1600~2800 models can be extended to 10K Ω

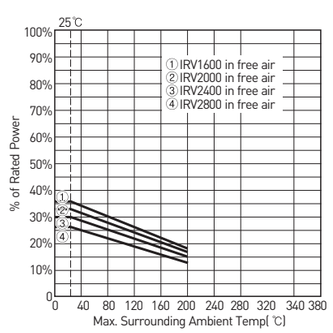
CHARACTERISTICS

Values in [ ] mean change in Ω after test

Max. Surrounding Ambient Temp.		-55℃~+200℃
Insulation Resistance		20MΩ minimum
Dielectric Withstanding Voltage		Available options : AC1500V, 2500V, 3500V, 4500V for 1minute
		maximum leakage current : 2mA
Temperature Coefficient		±260ppm/℃ maximum
Short Time Overload	±[3%+0.05Ω]	10 X Power rating 5 sec.
Moisture Resistance	±[3%+0.05Ω]	40℃, 95% RH, DC100V case to terminal (500hours)
Thermal Shock	±[5%+0.05Ω]	Power rating 30minutes, -25℃, 15minutes
Vibration	±[2%+0.05Ω]	10Hz-55Hz-10Hz (1minute), 2 hours. each direction
Moisture Load Life	±[3%+0.05Ω]	40℃, 95%RH, 0.1 x Power rating, 1.5 hours on, 30 minutes off, 500 hours
Load Life	±[5%+0.05Ω]	Power rating 1.5 hours on, 30 minutes off, 500hours

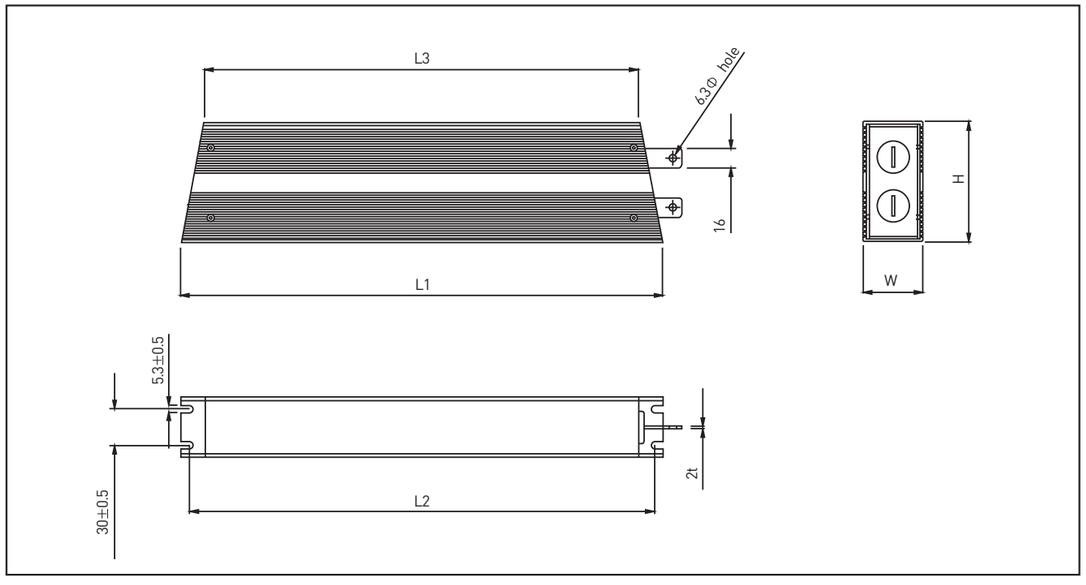
SURFACE TEMPERATURE INCREASE VERSUS POWER LOAD & DERATING CURVE





IRV, ULV 1600~2800

DIMENSIONS [mm]



Model	Dimensions(mm)					Weight(kg)
	L1±2	L2±2	L3±2	H±1	W±0.5	
IRV / ULV 1600	330	315	290	100	50	2.5
IRV / ULV 2000	400	385	360	100	50	3.1
IRV / ULV 2400	480	465	440	100	50	3.7
IRV / ULV 2800	550	535	510	100	50	4.3

FLYING LEADS

Model	3.5㎟	2㎟	UL3512 AWG 10	UL3512 AWG 14
IRV / ULV 1600	0.3Ω~0.99Ω	1Ω~	0.3Ω~0.99Ω	1Ω~
IRV / ULV 2000	0.45Ω~0.99Ω	1Ω~	0.45Ω~0.99Ω	1Ω~
IRV / ULV 2400	0.6Ω~0.99Ω	1Ω~	0.6Ω~0.99Ω	1Ω~
IRV / ULV 2800	0.7Ω~0.99Ω	1Ω~	0.7Ω~0.99Ω	1Ω~

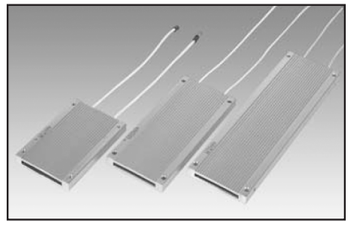
ORDERING PROCEDURE EXAMPLE

ULV1600 (Model #) — N (Non-inductive) — FL XXXX (Flying leads(mm):option) — 10Ω (Resistance) — J (Tolerance)

Thermal Protectors are avaiable - Please enquire.
Lead wires for installation should be at least 600V and able to withstand 200℃(ULV 1600-2800)

IRN, ULN, IRF, ULF

RoHS COMPLIANT | IP 65 | IP 67 Silicone Molding



The IRN(N=Narrow and flat) & IRF(F=Flat) models are metal-clad, wirewound, high-power, low inductance resistors designed for industrial and other applications where space is at a premium and performance is a must. The ULN and ULF are UL approved versions of these models. All of these models use an extruded aluminum housing providing rugged and strong protection. The flat design allows excellent heat dissipation. These models are available with flying leads or tab terminals. The most common applications for these models are: Motor drives, braking and snubber applications and power sources for industrial equipment.

■ GENERAL SPECIFICATIONS

Model	Rated Power on Heat Sink	Resistance Range[Ω]	Tolerance (%)
IRN 50 / ULN 50C	50W	1 ~ 420	D [±0.5] F [±1.0] G [±2.0] J [±5.0] K [±10]
IRN 100 / ULN 100C	100W	1 ~ 1.1K	
IRN 150 / ULN 150C	150W	1 ~ 1.75K	
IRF 100 / ULF 100C	100W	1 ~ 1.1K	
IRF 150 / ULF 150C	150W	1 ~ 1.75K	
IRF 200 / ULF 200C	200W	1 ~ 2.2K	
IRF 250 / ULF 250C	250W	1 ~ 2.79K	
IRF 300 / ULF 300C	300W	1 ~ 3.5K	
IRF 400	400W	1 ~ 4.45K	
ULF 400C		1 ~ 3.08K	
IRF 500	500W	1 ~ 5.78K	
ULF 500C		1 ~ 2.46K	

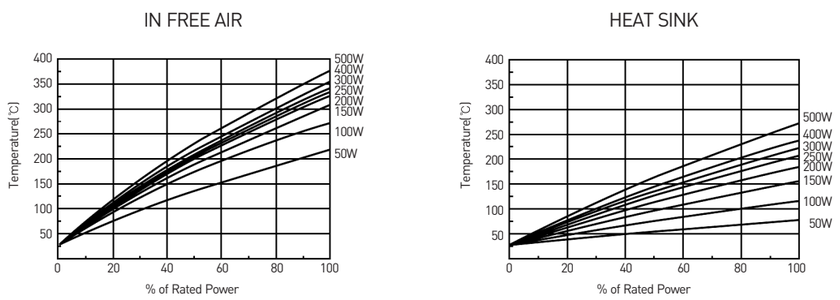
■ CHARACTERISTICS

Values in [ ] mean change in Ω after test

Temperature Range		Cement: -55~200℃, Silicone: -55~150℃
Insulation Resistance		20MΩ minimum
Dielectric Withstanding Voltage	IRN / IRF	Available options: Standard: AC1500, 2500V, 3000V, 4500V(maximum leakage current: 2mA)
	ULN / ULF	* See note: 500V for 1 minute: not more than 50V [1000V+(Voltage ratingx2)] for 1 minute: 50~600V [2000V+(Voltage ratingx2.25)] for 1 minute: 601~1500V
Temp. Coefficient		±260ppm / ℃ maximum
Short Time Overload	±[1%+0.05Ω]	50W: 5 x Power rating 5 sec., 100W~500W: 5 x Power rating 5 sec.
Moisture Resistance	±[2%+0.05Ω]	40℃, 95% RH, DC100V case to terminal, 500 hours
Thermal Shock	±[1%+0.05Ω]	Power rating 30 minutes, -25℃ 15 minutes
Vibration	±[1%+0.05Ω]	10Hz~55Hz~10Hz (1 minute), 2 hours each direction
Moisture Load Life	±[2%+0.05Ω]	40℃, 95%RH, 0.1 x Power rating 1.5 hours on, 30 minutes off, 500 hours
Load Life	±[5%+0.05Ω]	Power rating 1.5 hours on, 30 minutes off, 500 hours

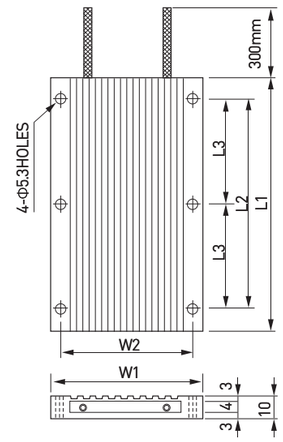
*Note ULN / ULF dielectric withstanding voltage options of AC 1500V, 3500V, 4500V are also available.
Optional dielectric withstanding voltage must be higher than standard(calculated by formula)

■ SURFACE TEMPERATURE INCREASE VERSUS POWER LOAD



■ DIMENSIONS [mm]

Model	Dimensions(mm) L1±1	L2±0.3	W1±0.3	W2±0.3	Weight(g)
IRN 50 / ULN 50C	70	50	60	50	100
IRN 100 / ULN 100C	120	100	60	50	160
IRN 150 / ULN 150C	170	150	60	50	220
IRF 100 / ULF 100C	90	70	80	70	155
IRF 150 / ULF 150C	120	100	80	70	200
IRF 200 / ULF 200C	150	130	80	70	245
IRF 250 / ULF 250C	180	160	80	70	290
IRF 300 / ULF 300C	210	190	80	70	335
IRF 400 / ULF 400C	270	250	80	70	430
IRF 500 / ULF 500C	330	310	80	70	525



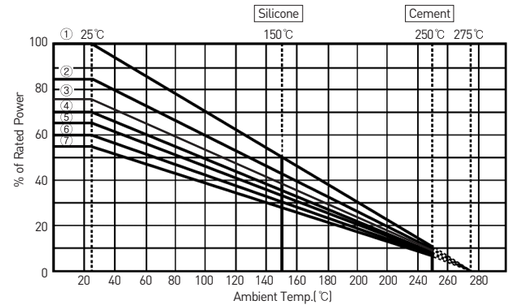
Silicon Heat Resistance Wire
1.25㎟ → 23A(60℃)
2.0㎟ → 33A(60℃)
UL 3512, AWG#16 → 26A(25℃)
IRF/ULF300, 400, 500 have 6 mounting holes.
Exact locations for the additional holes are shown in between the corner mounting holes. L2(L3=1/2 of L2)

■ FLYING LEADS

Model	2㎟	1.25㎟	UL 3512 AWG 16
IRN / F 50 ~ 150	×	1Ω ~	×
IRF 200	1Ω ~ 4Ω	4.1Ω ~	×
IRF 250	1Ω ~ 5Ω	5.1Ω ~	×
IRF 300	1Ω ~ 6Ω	6.1Ω ~	×
IRF 400	1Ω ~ 8Ω	8.1Ω ~	×
IRF 500	1Ω ~ 10Ω	10.1Ω ~	×
ULN / F 50C ~ 500C	×	×	1Ω ~

*Option: Flying leads options of UL3135, UL3139, UL3071, UL3172 are also available

■ DERATING CURVES



① IRF, IRN, ULF, ULN100~500 on heat sink, IRN, ULN 50 in free air
② IRF, IRN, ULF, ULN100 in free air
③ IRF, IRN, ULF, ULN150 in free air
④ IRF, ULF200 in free air
⑤ IRF, ULF250~300 in free air
⑥ IRF, ULF400 in free air
⑦ IRF, ULF500 in free air

Heat sink size: IRF, IRN, ULF, ULN100~200 = 200×200×3 mm
IRF, ULF 250~400 = 400×400×3 mm
IRF, ULF 500 = 600×600×3 mm

This curve is for cement filled resistors only.
For silicone filled resistors, care must be taken to maintain the surface temperature below 150℃. In some applications, mounting on a heat sink is advisable.

■ ORDERING PROCEDURE EXAMPLE

IRF500 (Model #) | C (Filling Material) | 100Ω (Resistance) | J (Tolerance)

C=Cement(standard)
S=Silicone

Thermostat options are availble for these models: Interal and discreet connection. Please ask RARA for more info on this.

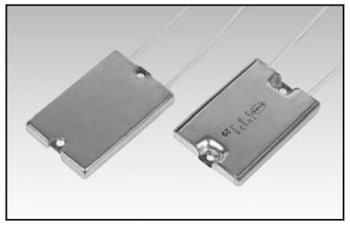
IRS

RoHS COMPLIANT

The IRS30, 50 are slim and flat, economical resistors. These models are ideal for applications where space and funds are at a premium. The most common applications for these models are: Motor drives, braking and snubber applications and power sources for industrial equipment.

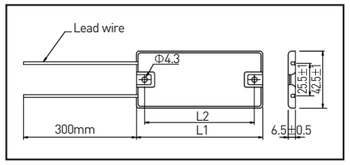
GENERAL SPECIFICATIONS

Model	Rated Power on Heat Sink	Resistance Range[Ω]	Resistance Tolerance (%)
IRS 30	30W	1 ~ 420	D [±0.5], F [±1.0], G [±2.0], J [±5.0], K [±10]
IRS 50	50W	1 ~ 500	



DIMENSIONS [mm]

Model	Dimensions [mm]		Weight [g]
	L1±1	L2±1	
IRS 30	65	57	65
IRS 50	90	78	50



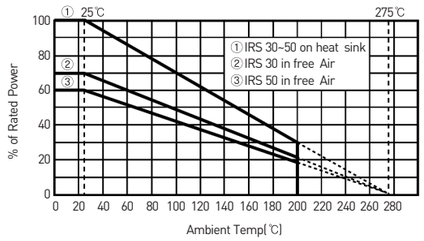
CHARACTERISTICS

Values in [ ] mean change in Ω after test

Temperature Range		-55℃ to 200℃
Insulation Resistance		20MΩ minimum
Dielectric Withstanding Voltage		Available options: AC1500V, 2500V, maximum. leakage current: 2mA
Temp. Coefficient		±260ppm/℃ maximum
Short Time Overload	±[2%+0.05Ω]	5 x Power rating 5 sec.
Thermal Shock	±[2%+0.05Ω]	Power rating 30 minutes, -25℃ 15 minutes
Load Life	±[5%+0.05Ω]	Power rating 1.5 hours on, 30 minutes off, 500 hours

SURFACE TEMPERATURE INCREASE VS. POWER LOAD

DERATING CURVES



① On chassis, 30W, 50W (Heat sink size: 200 x 200 x 3 mm)
② Free air 30W
③ Free air 50W

ORDERING PROCEDURE EXAMPLE

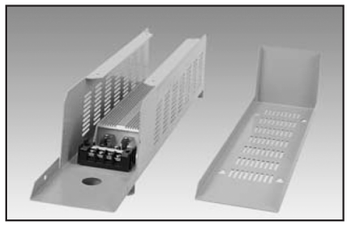
RA

Resistor Assemblies

The RA series of power metal clad, wire wound resistors are designed for use in power inverters. The basis for these models is an IRH or IRV resistor surrounded by a metal case, which conforms to international safety specifications. The steel case is powder coated and baked for durability.

GENERAL SPECIFICATIONS

Model	Resistor Type Inside	Power Rating in Free Air	Resistance Range[Ω]		Resistance Tolerance (%)
			Inductive	Non-Inductive	
RA080	IRH80	80W	0.1 ~ 910	0.1 ~ 110	D [±0.5] F [±1.0] G [±2.0] J [±5.0] K [±10]
RA100	IRH100	90W	0.1 ~ 1.1K	0.1 ~ 240	
RA200	IRH200	140W	0.1 ~ 2.2K	0.1 ~ 1K	
RA300	IRH300	210W	0.1 ~ 2.7K	0.1 ~ 1.5K	
RA400	IRH400	240W	0.1 ~ 4.3K	0.1 ~ 2.2K	
RA500	IRH500	300W	0.1 ~ 6.8K	0.1 ~ 3K	
RA600	IRV600	320W	0.1 ~ 94	0.1 ~ 23	
RA800	IRV800	360W	0.1 ~ 112	0.1 ~ 28	
RA1000	IRV1000	400W	0.1 ~ 140	0.1 ~ 36	
RA1200	IRV1200	420W	0.1 ~ 160	0.1 ~ 48	
RA1600	IRV1600	570W	1.5 ~ 88	0.3 ~ 23	
RA2000	IRV2000	650W	2.0 ~ 113	0.45 ~ 30.5	
RA2400	IRV2400	720W	2.5 ~ 144	0.6 ~ 37	



CHARACTERISTICS

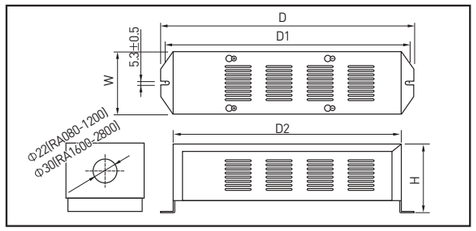
Values in [ ] mean change in Ω after test

Temperature Range		-55℃ ~ +200℃
Insulation Resistance		20MΩ minimum
Dielectric Withstanding Voltage		Available options: AC1500V, 3500V, 4500V, 5400V(maximum leakage current: 2mA)
Temp. Coefficient		±260ppm℃ maximum
Short Time Overload	±[2%+0.05Ω]	10 x Power rating 5 sec.
Moisture Resistance	±[3%+0.05Ω]	40℃, 95% RH, DC100V case to terminal, 500 hours
Thermal Shock	±[2%+0.05Ω]	Power rating 30 minutes, -25℃ 15 minutes

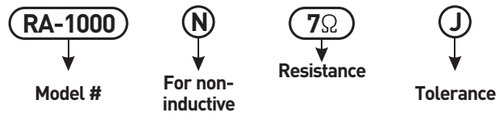
DIMENSIONS [mm]

Model	Weight [g]	Dimensions [mm]				
		W±2	H±2	D±2	D1±2	D2±2
RA080	980	78.5	67	254	240	224
RA100	1000	78.5	67	254	240	224
RA200	2415	94.5	105	440	425	410
RA300	2530	94.5	105	440	425	410
RA400	2700	94.5	105	440	425	410
RA500	2920	94.5	105	440	425	410
RA600	3095	94.5	105	440	425	410
RA800	3430	94.5	105	440	425	410
RA1000	3725	94.5	105	440	425	410
RA1200	4194	94.5	105	510	496	480
RA1600	5900	94.5	147	615	600	584
RA2000	6500	94.5	147	615	600	584
RA2400	7100	94.5	147	615	600	584

DIMENSIONS (mm)



ORDERING PROCEDURE EXAMPLE



These models come with multiple conduit knockouts for easy wiring
The enclosure is well ventilated and meets int'l safety specs

RoHS COMPLIANT

Low Cost Resistor Assembly(LCA(V))

Preliminary version

These economical and powerful components comprise two, three or four high power resistors housed in partial steel covers at each end. These rugged, powder coated covers ensure an excellent seal. The internal resistors use aluminum plates at each end instead of our standard cement molding. This innovation reduces construction time and reduces cost, at no reduction of performance. The major application of this exciting new model is high power inverter braking units.

■ GENERAL SPECIFICATIONS

Model	Internal Resistor Type	Power Rating in free air [W]	Resistance Range [ohms]		Resistance Tolerance [%]
			Inductive	Non-Inductive	
LCAH 3200	ULV 1600X2	1.0k	2.3 - 160	0.6 - 46	J [±5] K [±10]
LCAH 4000	ULV 2000X2	1.2k	3.0 - 220	0.9 - 61	
LCAH 4800	ULV 2400X2	1.3k	4.0 - 280	1.0 - 74	
LCAH 5600	ULV 2800X2	1.4k	4.5 - 270	1.0 - 67	
LCAH 4800	ULV 1600X3	1.3k	0.75 - 265	0.9 - 69	
LCAH 6000	ULV 2000X3	1.4k	1.0 - 330	1.2 - 91	
LCAH 7200	ULV 2400X3	1.5k	1.5 - 420	1.5 - 111	
LCAH 8400	ULV 2800X3	1.6k	1.5 - 390	1.5 - 100	
LCAH 6400	ULV 1600X4	1.7k	0.5 - 340	1.2 - 92	
LCAH 8000	ULV 2000X4	1.9k	0.75 - 440	1.8 - 122	
LCAH 9600	ULV 2400X4	2.1k	1.0 - 560	2.0 - 148	
LCAH 11200	ULV 2800X4	2.3k	1.1 - 520	2.0 - 134	
LCAV 9600	ULV 1600X6	3.0k	0.25 - 528	0.1 - 138	
LCAV 12000	ULV 2000X6	3.6k	0.33 - 678	0.1 - 183	
LCAV 14400	ULV 2400X6	3.9k	0.41 - 864	0.1 - 222	
LCAV 16800	ULV 2800X6	4.2k	0.5 - 810	0.12 - 201	

■ CHARACTERISTICS

Values in [ ] mean change in ohmic value after test

Temperature Range		-55℃ to +275℃
Insulation Resistance		20MΩ minimum
Dielectric Withstanding Voltage		Available options: AC1500V, 3500V(maximum leakage current: 2mA)
Temp. Coefficient		±260ppm/C maximum
Short Time Overload	± [2%+0.05Ω]	10 X Power rating 5 sec.
Moisture Resistance	± [3%+0.05Ω]	40C, 95% RH, DC100V case to terminal, 500 hours
Thermal Shock	± [2%+0.05Ω]	Power rating 30 minutes, -25℃ 15 minutes
Vibration	± [2%+0.05Ω]	10Hz-55Hz-10Hz (1 minute), 2 hours each direction.
Load life	± [5%+0.05Ω]	Power rating 1.5 hours on, 30 minutes off, 500 hours

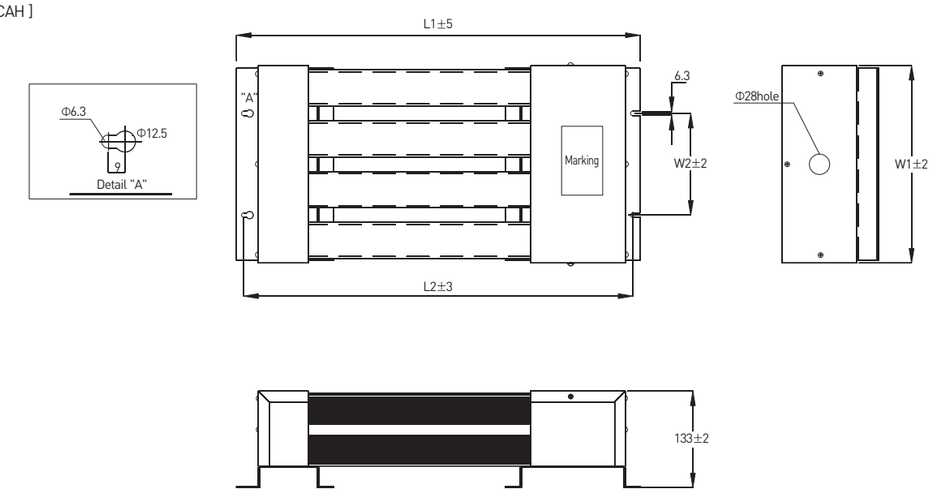
■ DIMENSIONS [mm]

Model	Weight [Kg]	Dimensions [mm]			
		L1±5	L2±3	W1±2	W2±2
LCAH 3200	6.5	484	463	134	79
LCAH 4000	7.5	554	533		
LCAH 4800	8.5	634	613		
LCAH 5600	10.0	704	683		
LCAH 4800	9.0	484	463	204	140
LCAH 6000	11.0	554	533		
LCAH 7200	13.0	634	613		
LCAH 8400	15.0	704	683		
LCAH 6400	12.0	484	463	274	
LCAH 8000	14.0	554	533		
LCAH 9600	16.5	634	613		
LCAH 11200	19.0	704	683		
LCAV 9600	16.5	539	519	125	79
LCAV 12000	20.0	609	589		
LCAV 14400	23.5	689	669		
LCAV 16800	27.5	759	739		

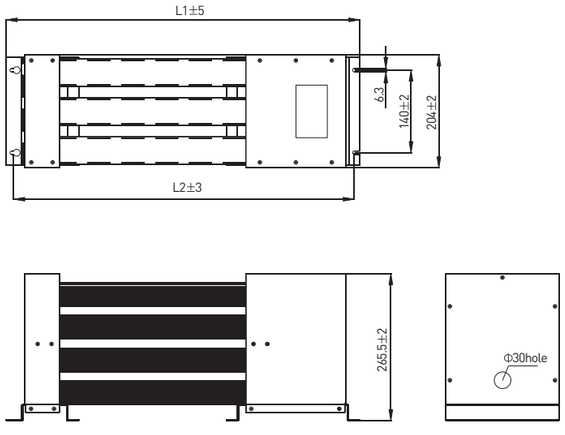
LCAH / LCAV

RoHS COMPLIANT

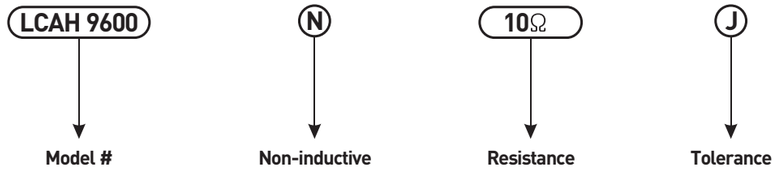
[LCAH]



[LCAV]



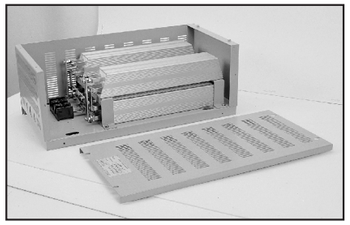
■ ORDERING PROCEDURE EXAMPLE

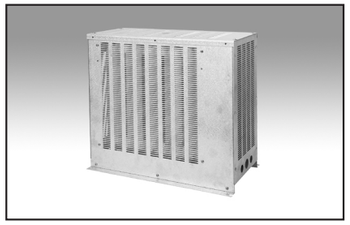


Thermostat options are available for these models

High Power Resistor Assemblies

The HRA series of high power, metal clad, wire wound resistors are designed for use in high power inverters. The basis for these models are sets of IRV resistors surrounded by a metal case, which conforms to international safety specifications. The steel case is powder coated and baked for durability





GENERAL SPECIFICATIONS

Model	Resistor Type Inside	Power Rating		Resistance Range[Ω]		Resistance Tolerance(%)
		In Free Air	With Fan	Inductive	Non-Inductive	
HRA(V)2400	2×IRV1200	960W	1800W	0.1 ~ 320	0.1 ~ 96	D [±0.5] F [±1.0] G [±2.0] J [±5.0] K [±10]
HRA(V)3600	3×IRV1200	1250W	2100W	0.1 ~ 480	0.1 ~ 144	
HRA(V)4800	4×IRV1200	1500W	2400W	0.1 ~ 640	0.1 ~ 192	
HRA(V)6000	5×IRV1200	1700W	2700W	0.1 ~ 800	0.1 ~ 240	
HRA(V)7200	6×IRV1200	1950W	3100W	0.1 ~ 960	0.1 ~ 288	
HRA(V)8400	7×IRV1200	2200W	3600W	0.1 ~ 1120	0.1 ~ 336	
HRA(V)9600	8×IRV1200	2600W	4050W	0.1 ~ 1280	0.1 ~ 384	
HRA(V)10800	9×IRV1200	2900W	4500W	0.1 ~ 1440	0.1 ~ 432	
HRA(V)12000	10×IRV1200	3200W	5000W	0.1 ~ 1600	0.1 ~ 480	

CHARACTERISTICS

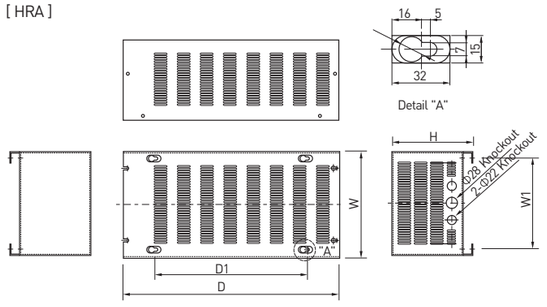
Values in [ ] mean change in Ω after test

Temperature Range		-55℃ to +200℃
Insulation Resistance		20MΩ minimum
Dielectric Withstanding Voltage		Available options: AC1500V, 2500V, 3500V; maximum. leakage current: 2mA
Temp. Coefficient		±260ppm/℃ maximum
Short Time Overload	±[2%+0.05Ω]	10×wattage rating-5 sec.
Moisture Resistance	±[3%+0.05Ω]	40℃, 95% RH, DC100V case to terminal (500hours)
Thermal Shock	±[2%+0.05Ω]	Power rating 30 minutes, -25℃, 15 minutes

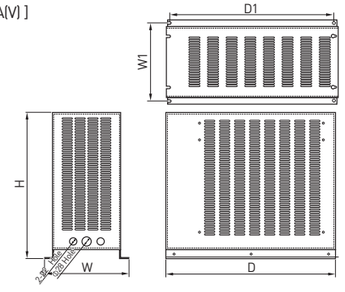
DIMENSIONS [mm]

	Weight [Kg]	Dimensions [mm]				
		W±5	D±5	H±3	W1±2	D1±2
HRA(V)2400	14.1	252 / 248(V)	580 / 500(V)	110 / 501(V)	215 / 228(V)	430 / 482(V)
HRA(V)3600	16.4	252 / 248(V)	580 / 500(V)	110 / 501(V)	215 / 228(V)	430 / 482(V)
HRA(V)4800	18.7	388[252] /248(V)	580 / 500(V)	110[192] / 501(V)	356[215] / 228(V)	430 / 482(V)
HRA(V)6000	21.0	388[252] / 248(V)	580 / 500(V)	110[192] / 501(V)	356[215] / 228(V)	430 / 482(V)
HRA(V)7200	23.3	388[252] / 248(V)	580 / 500(V)	110[192] / 501(V)	356[215] / 228(V)	430 / 482(V)
HRA(V)8400	25.6	388 / 248(V)	580 / 500(V)	192 / 501(V)	356 / 228(V)	430 / 482(V)
HRA(V)9600	27.9	388 / 248(V)	580 / 500(V)	192 / 501(V)	356 / 228(V)	430 / 482(V)
HRA(V)10800	30.2	388 / 248(V)	580 / 500(V)	192 / 501(V)	356 / 228(V)	430 / 482(V)
HRA(V)12000	32.5	388 / 248(V)	580 / 500(V)	192 / 501(V)	356 / 228(V)	430 / 482(V)

[HRA]

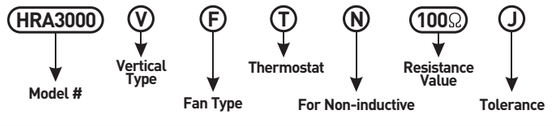


[HRA(V)]



ORDERING PROCEDURE EXAMPLE

These models come with multiple conduit knockouts for easy wiring.
The enclosure is well ventilated and meets int'l safety specs.

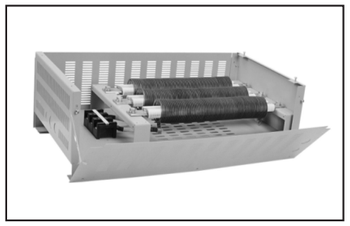


Edge Wound Resistor Assemblies

The EW series of metal clad edge wound resistors are designed for use in super high power inverters. The basis for these models are edge wound elements, surrounded by a metal case, which conforms to international safety specifications. The steel case is powder coated and baked for durability.

GENERAL SPECIFICATIONS

Model	Power Rating		Resistance Range[Ω]	Resistance Tolerance [%]
	With Fan	In Free Air		
EWS 10K	4.5 KW	3KW	0.5 ~ 3.0	J [±5.0] K [±10]
EWS 13K	6 KW	4KW	0.7 ~ 4.0	
EWS 17K	7.5 KW	5KW	0.9 ~ 5.0	
EWS 20K	9 KW	6KW	1.0 ~ 6.0	
EWS 26K	12 KW	8KW	1.4 ~ 8.0	
EWF 10K	4.5 KW	3KW	3.1 ~ 18	
EWF 13K	6 KW	4KW	4.2 ~ 24	
EWF 17K	7.5 KW	5KW	5.2 ~ 30	
EWF 20K	9 KW	6KW	6.1 ~ 36	
EWF 26K	12 KW	8KW	6.4 ~ 48	



Note:
The EWS series use SUS 304 resistance wire.
The EWF series use FCHW resistance wire.

CHARACTERISTICS

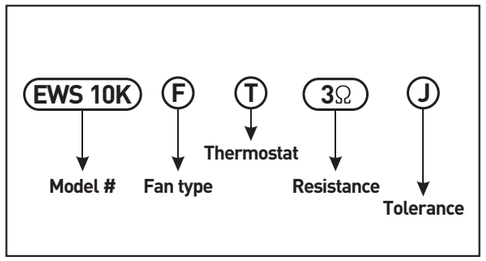
Values in [ ] mean change in Ω after test

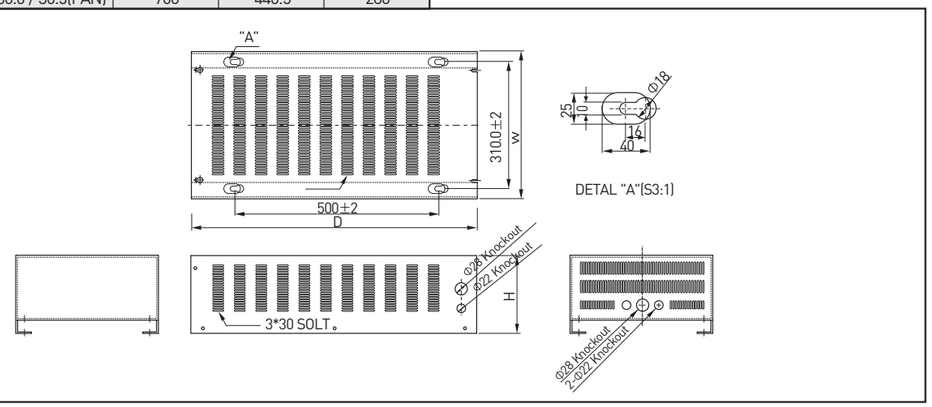
Temperature Range		-55℃ ~ 200℃
Insulation Resistance		20MΩ minimum
Dielectric Withstanding Voltage		Available options: AC1500V, 3500V, 4500V, 5400V(maximum. leakage current: 2mA)
Temp. Coefficient		EWS: ±800ppm/℃ max. EWF: ±260ppm/℃ maximum
Short Time Overload	±[2%+0.05Ω]	10 X Power rating 5 sec.
Moisture Resistance	±[3%+0.05Ω]	40℃, 95% RH, DC100V case to terminal, 500 hours
Thermal Shock	±[2%+0.05Ω]	Power rating 30 minutes, -25℃ 15 minutes

DIMENSIONS [mm]

Model	Approx. Weight [Kg]	Dimensions [mm]		
		D±5	W±4	H±4
EWS10K	17 / 17.5(FAN)	700	356	191
EWS13K	23.0 / 23.5(FAN)	700	446.5	191
EWS17K	25.0 / 25.5(FAN)	700	446.5	191
EWS20K	26.5 / 27.0(FAN)	700	356	280
EWS26K	35.0 / 35.5(FAN)	700	446.5	280
EWF10K	15.0 / 15.5(FAN)	700	356	190
EWF13K	20.0 / 20.5(FAN)	700	446.5	191
EWF17K	21.5 / 22.0(FAN)	700	446.5	191
EWF20K	22.5 / 23.0(FAN)	700	356	280
EWF26K	30.0 / 30.5(FAN)	700	446.5	280

ORDERING PROCEDURE EXAMPLE

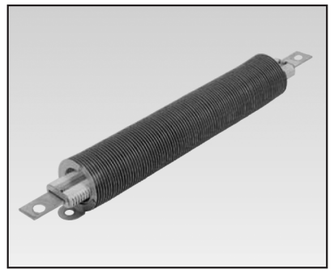




Edge Wound Resistors

■ GENERAL SPECIFICATIONS

Model	Power Rating		Resistance Range[Ω]		Resistance(%)
	With Fan	In Free Air	EWS	EWF	
EWS / EWF 1200	600W	400W	0.02 ~ 0.25	0.26 ~ 3.3	J [±5.0] K [±10]
EWS / EWF 1700	1000W	600W	0.029 ~ 0.28	0.39 ~ 4.95	
EWS / EWF 2300	1.3kW	800W	0.039 ~ 0.50	0.51 ~ 6.6	
EWS / EWF 2800	1.6kW	1kW	0.051 ~ 0.63	0.64 ~ 8.2	
EWS / EWF 3400	2kW	1.2kW	0.061 ~ 0.75	0.76 ~ 9.9	
EWS / EWF 3900	2.3kW	1.4kW	0.071 ~ 0.88	0.89 ~ 11.5	
EWS / EWF 4400	2.6kW	1.6kW	0.081 ~ 1.00	1.10 ~ 13.2	



■ CHARACTERISTICS

Temperature Range	-55℃ ~ 375℃
Insulation Resistance	100MΩ minimum
Dielectric Withstanding Voltage	AC 2000V for 1 minute

■ %INCREASE IN RATED CURRENT

%ED	5%	10%	15%	40%	60%
Increased Rated Current	2.5×Current Rating	1.8×Current Rating	1.6×Current Rating	1.25×Current Rating	1.15×Current Rating

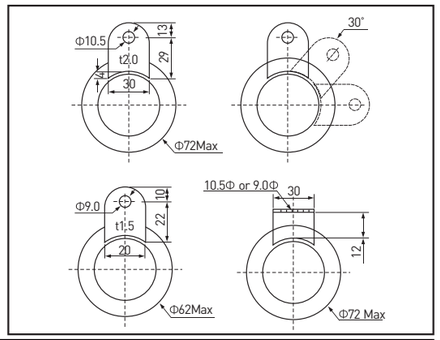
■ RATED CURRENTS BY MODELS AND OHMIC VALUES

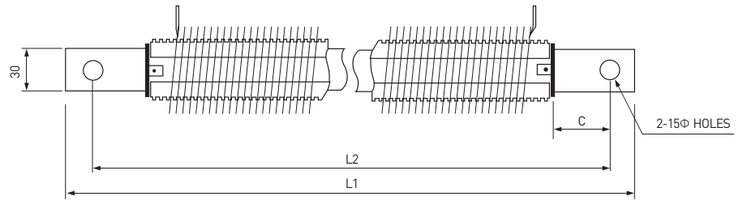
Resistance[Ω]							Rated Current	D#
EWS / EWF 1200	EWS / EWF 1700	EWS / EWF 2300	EWS / EWF 2800	EWS / EWF 3400	EWS / EWF 3900	EWS / EWF 4400		
0.02	0.029	0.039	0.051	0.061	0.071	0.081	140	69
0.023	0.035	0.047	0.059	0.071	0.082	0.094	130	65
0.027	0.041	0.055	0.069	0.083	0.097	0.111	120	65
0.033	0.049	0.066	0.082	0.099	0.115	0.132	110	72
0.04	0.06	0.08	0.1	0.12	0.14	0.16	100	72
0.044	0.066	0.088	0.110	0.132	0.155	0.177	95	72
0.049	0.074	0.098	0.123	0.148	0.172	0.197	90	72
0.055	0.083	0.110	0.138	0.166	0.193	0.221	85	71
0.062	0.093	0.125	0.156	0.187	0.218	0.25	80	67
0.071	0.106	0.142	0.177	0.213	0.248	0.284	75	65
0.081	0.122	0.163	0.204	0.244	0.285	0.326	70	69
0.094	0.142	0.189	0.236	0.284	0.331	0.378	65	65
0.111	0.166	0.222	0.277	0.333	0.388	0.444	60	67
0.132	0.198	0.264	0.330	0.396	0.462	0.528	55	71
0.16	0.24	0.32	0.4	0.48	0.56	0.64	50	71
0.197	0.296	0.395	0.493	0.592	0.691	0.790	45	67
0.25	0.375	0.5	0.625	0.75	0.875	1	40	67
0.326	0.489	0.653	0.816	0.979	1.142	1.306	35	67
0.444	0.666	0.888	1.111	1.333	1.555	1.777	30	65
0.64	0.96	1.28	1.6	1.92	2.24	2.56	25	61
1	1.5	2	2.5	3	3.5	4	20	55

EWS, EWF RoHS COMPLIANT

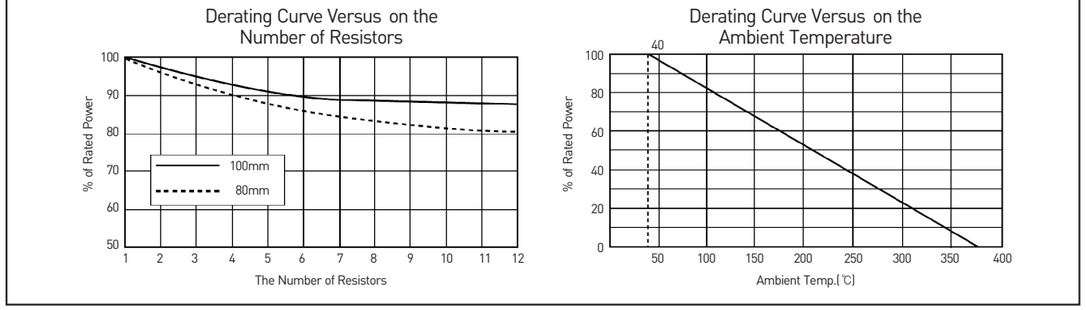
■ DIMENSIONS [mm]

Model	Dimensions [mm]		
	L1±3	L2±3	C±2
EWS / EWF 1200	240	205	18 ~ 23
EWS / EWF 1700	310	275	
EWS / EWF 2300	380	345	
EWS / EWF 2800	450	415	
EWS / EWF 3400	520	485	
EWS / EWF 3900	590	555	
EWS / EWF 4400	660	625	

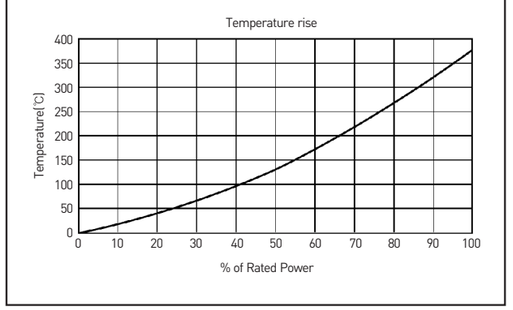




■ DERATING CURVES



■ SURFACE TEMPERATURE VERSUS POWER LOAD



■ ORDERING PROCEDURE EXAMPLE

EWS1200 (Model #) — 140A (Rated Amps) — 0.02Ω (Resistance) — J (Tolerance)

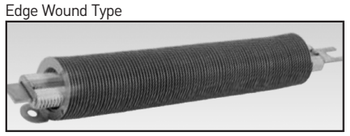
When designing your system specifications, or if you have any questions, contact the RARA design team for more information.

Dynamic Braking Resistors

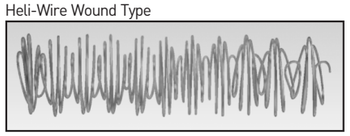
■ SPECIFICATIONS

Model	Power Rating With Fan	Power Rating Free Air	Resistance Range[Ω]	Tolerance(%)
DBRI-EW 16K	9.6 kW	8 kW	2 ~ 40	J [±5] K [±10]
DBRI-EW 30K	18 kW	15 kW	2 ~ 12	
DBRI-EW 40K	24 kW	20 kW	2 ~ 20	
DBRI-EW 50K	30 kW	25 kW	3 ~ 20	
DBRI-EW 70K	40 kW	35 kW	3 ~ 40	
DBRI-EW 100K	60 kW	50 kW	5 ~ 40	
DBRI-HW 16K	9.6 kW	8 kW	3 ~ 65	
DBRI-HW 30K	18 kW	15 kW	3 ~ 30	
DBRI-HW 40K	24 kW	20 kW	3 ~ 50	
DBRI-HW 50K	30 kW	25 kW	5 ~ 50	
DBRI-HW 70K	40 kW	35 kW	10 ~ 70	
DBRI-HW 100K	60 kW	50 kW	10 ~ 150	
DBRI-VW 16K	9.6 kW	8 kW	1 ~ 9.5	
DBRI-VW 30K	18 kW	15 kW	1.2 ~ 10	
DBRI-VW 40K	24 kW	20 kW	1.2 ~ 18	
DBRI-VW 50K	30 kW	25 kW	1.5 ~ 20	
DBRI-VW 70K	40 kW	35 kW	1.5 ~ 35	
DBRI-VW 100K	60 kW	50 kW	1.5 ~ 40	

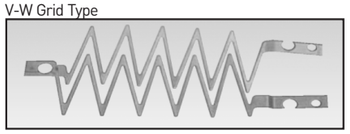
Edge Wound Type



Heli-Wire Wound Type



V-W Grid Type

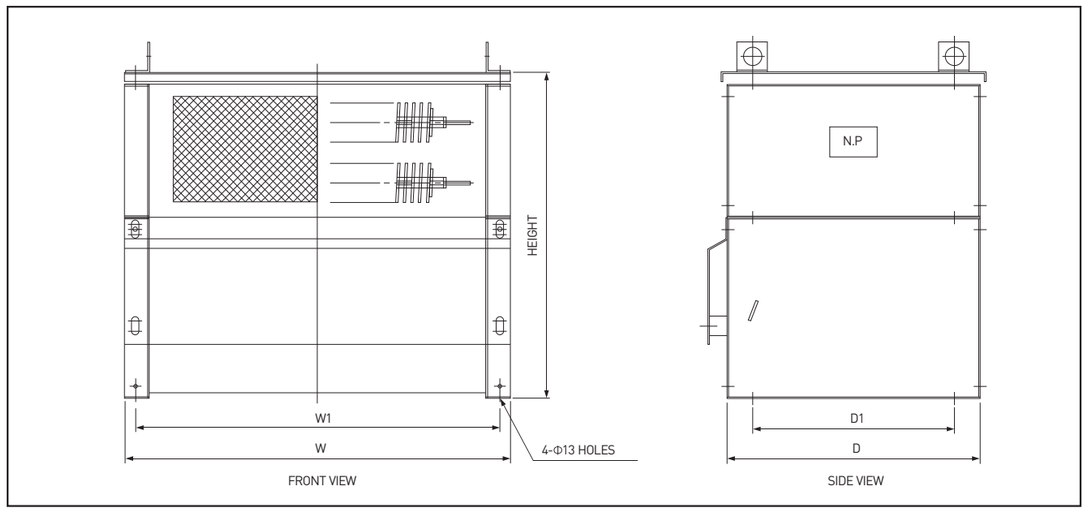


* DBRI-EW: Edge wound type (Inductive)
  DBRI-HW: Heli-wire wound type (Inductive)
  DBRI-VW: V-W grid type (Non-Inductive)
* The DBRI is for indoor use; DBRO is for outdoor use.
  The DBRO internal structure is the same as the DBRI
  The DBRO has a watertight external structure
* The Power rating is based on a 375℃ rise above an ambient of 40 ℃

* Fan equipped models have different dimensions
  (Check with RARA for details)
* Power increases of up to 100% are possible with some fan equipped models with corresponding increases in dimensions]
  (Check with RARA for details)

■ DIMENSIONS [mm] FOR INDOOR TYPES

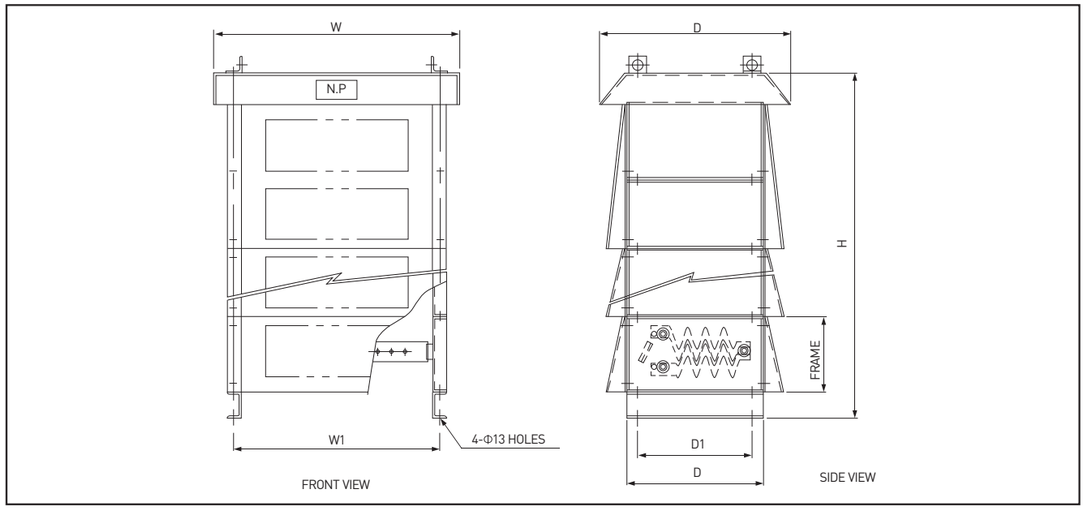
Model	Approx. Weight(kg)	Dimensions [mm]				
		W	W1	D	D1	H
DBRI-EW, HW, VW 16K	26	640	605	420	335	320
DBRI-EW, HW, VW 30K	55	640	605	420	335	540
DBRI-EW, HW, VW 40K	64	640	605	420	335	540
DBRI-EW, HW, VW 50K	80	640	605	420	335	760
DBRI-EW, HW, VW 70K	120	640	605	420	335	1200
DBRI-EW, HW, VW 100K	235	640	605	840	755	980 / 1200



DBR

■ DIMENSIONS [mm] FOR OUTDOOR TYPES

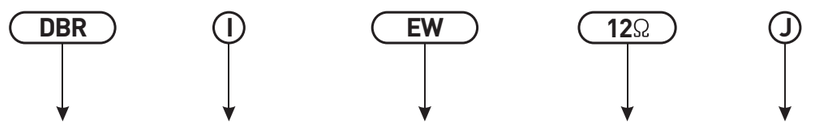
Model	Approx. Weight(kg)	Dimensions [mm]				
		W	W1	D	D1	H
DBRO-EW, HW, VW 16K	32	720	605	560	335	390
DBRO-EW, HW, VW 30K	60	720	605	560	335	590
DBRO-EW, HW, VW 40K	72	720	605	560	335	590
DBRO-EW, HW, VW 50K	87	720	605	560	335	790
DBRO-EW, HW, VW 70K	130	720	605	560	335	1190
DBRO-EW, HW, VW 100K	250	720	605	980	755	1190



■ CHARACTERISTICS

Insulating Resistance	Minimum.100MΩ
Dielectric Withstanding Voltage	AC 2000V/minimum
Allowable Temp. Rise	375℃

■ ORDERING PROCEDURE EXAMPLE



Load Banks

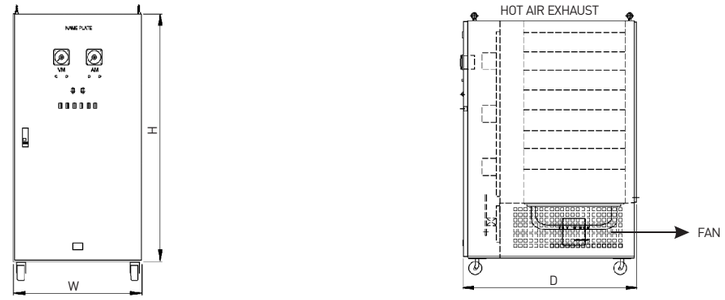
RARA manufactures load banks, ranging from small portable units for testing generators to multi-megawatt designs for larger applications. Regular load testing, along with correct battery maintenance, is the best way of ensuring the reliability of standby power systems. It is routine for all newly-installed generating sets to have a load test during the commissioning process in order to prove the performance of the set and all its ancillaries-cooling system, exhaust system, switchgear and protection schemes.

· Custom designed for your particular system
· Several stages of assembly depending on shipping needs
· Many sizes and applications available

■ GENERAL SPECIFICATIONS

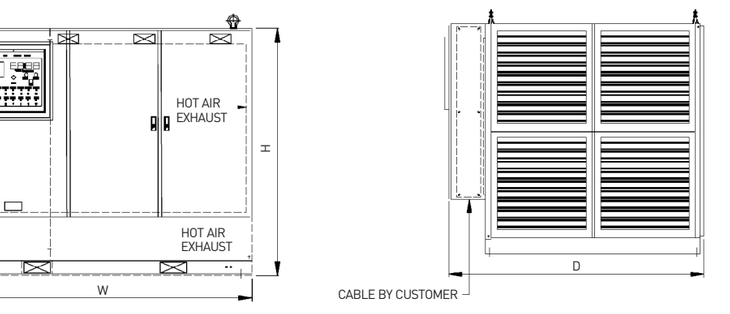
Model	Rated Power	Load Steps		Weight Approx.	Cooling Fan Source
		Min	Max		
RLB-50V	50kW	1kW	20kW	160	1 Phase 220V 60Hz 50Hz Optional
RLB-50H					
RLB-100V	100kW	1kW	50kW	220	
RLB-100H					
RLB-200V	200kW	5kW	100kW	350	
RLB-200H					
RLB-300V	300kW	5kW	100kW	480	
RLB-300H					
RLB-400V	400kW	5kW	200kW	530	3 Phase 380V 60Hz 50Hz Optional
RLB-400H					
RLB-500V	500kW	5kW	200kW	750	
RLB-500H					
RLB-600V	600kW	5kW	300kW	960	
RLB-600H					
RLB-800V	800kW	5kW	300kW	1350	
RLB-800H					
RLB-1000V	1000kW	5kW	500kW	1740	
RLB-1000H					
RLB-1500V	1500kW	5kW	500kW	2320	
RLB-1500H					
RLB-2000V	2000kW	5kW	1000kW	2850	
RLB-2000H					
RLB-2500V	2500kW	5kW	1000kW	3580	
RLB-2500H					
RLB-3000V	3000kW	5kW	1000kW	3970	
RLB-3000H					

■ DIMENSIONS [mm] FOR INDOOR TYPES



Model	Dimensions [mm]		
	W	D	H
RLB-50V	600	800	1000
RLB-100V	800	1050	1200
RLB-200V	800	1050	1200
RLB-300V	1000	1250	1650
RLB-400V	1000	1250	1650
RLB-500V	1650	1300	1800
RLB-600V	1650	1300	1800
RLB-800V	2200	1600	2350
RLB-1000V	2200	1600	2350
RLB-1500V	2200	1600	2350
RLB-2000V	2200	1600	2350
RLB-2500V	20" Container		
RLB-3000V	20" Container		

■ DIMENSIONS [mm] FOR OUTDOOR TYPES



Model	Dimensions [mm]		
	W	D	H
RLB-50H	1000	600	700
RLB-100H	1200	1000	800
RLB-200H	1600	1000	950
RLB-300H	1850	1200	1200
RLB-400H	1850	1200	1200
RLB-500H	1900	1300	1700
RLB-600H	1900	1300	1700
RLB-800H	2000	1500	2000
RLB-1000H	2600	1500	2150
RLB-1500H	2800	1500	2150
RLB-2000H	3000	2200	2350
RLB-2500H	20" Container		
RLB-3000H	20" Container		

■ LOAD BANK DERATING

480V	440V		380V		220V	
1100kW	924kW	1212A	689kW	1047A	231kW	606A
1000kW	840kW	1102A	627kW	953A	210kW	551A
800kW	672kW	882A	501kW	761A	168kW	441A
600kW	504kW	661A	376kW	571A	126kW	331A
500kW	420kW	551A	313kW	476A	105kW	276A
200kW	168kW	220A	125kW	190A	42kW	110A
100kW	84kW	110A	63kW	96A	21kW	55A
50kW	42kW	55A	31kW	47A	10.5kW	27.5A
30kW	25.2kW	33A	19kW	29A	6.3kW	16.5A
10kW	8.4kW	11A	6kW	9.1A	2.1kW	5.5A
5kW	4.2kW	5.5A	3kW	4.5A	1.05kW	2.75A
2Kkw	1.68kW	2.2A	1.25kW	1.9A	0.42kW	1.1A

■ ADDITIONAL INFORMATION

1. The V type is an indoor model.
2. The H type is both indoor and outdoor.
3. Options: Main switch, Digital meter, Air circuit breaker, Connection cable.
4. Applied voltage: 3 phase, 480V, 60Hz.(220V, 380V, 440V, 600V, 3.3KV, 6.6KV are also available)
5. Environmental Conditions: Ambient temperature lower than 40C; Altitude less than 1000m.
6. Basic accessories are as follows:

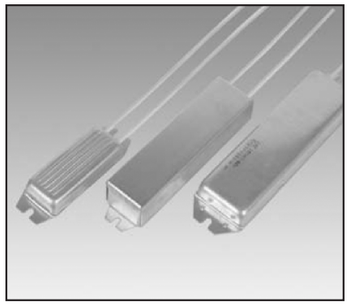
- Step load on-off switch
- Magnetic contactor
- Control MCCB(1 phase, 220V, 60Hz)
- Alarm signal - pilot lamp
- Emergency stop button
- Reset button
- Fan failure protection
- Over temperature protection
- Cooling fan

■ ORDERING INFORMATION AND NOTES

RLB	1000	V	HW	480	AT	J
Model #	Power Capacity	V: Vertical = indoor H: Horizontal = outdoor	Element Type	Applied Voltage	AT: AC, 3Φ AS: AC, 1Φ D: DC	Tolerance

Metal Clad Economy Resistors

IRB60, 80, 120 metal clad, wire wound resistors are ideal for applications that require 60W~120W or less and are on a budget. These models come in a durable metal case and have flying leads.



■ GENERAL SPECIFICATIONS

Model	Power Rating	Resistance Range[Ω]		Resistance Tolerance (%)
		Inductive	Non-Inductive	
IRB 60	60W	0.1 ~ 270	0.1 ~ 56	G [±2] H [±3] J [±5] K [±10]
IRB 80	80W	0.1 ~ 910	0.1 ~ 110	
IRB 120	120W	0.1 ~ 1.3K	0.1 ~ 300	

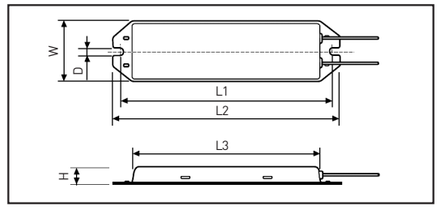
■ CHARACTERISTICS

Values in [ ] mean change in Ω after test

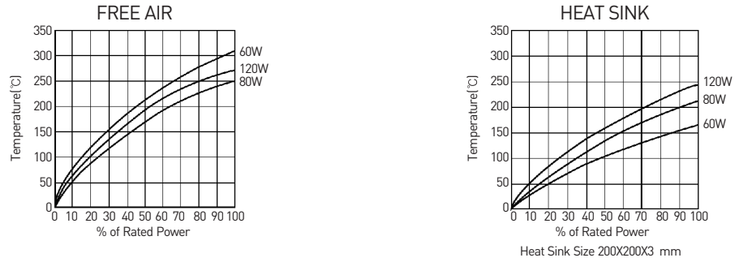
Temperature Range		-55℃ ~ 200℃
Insulation Resistance		20MΩ minimum
Dielectric Withstanding Voltage		Available options: AC1500V, 3500V, 4500V, 5400V maximum. leakage current: 2mA
Temp. Coefficient		±260ppm/℃ maximum
Short time Overload	ΔR±[2%+0.05Ω]	60W: 5×Power rating, 80W, 120W: 10×power rating 5 sec.
Moisture Resistance	ΔR±[3%+0.05Ω]	40℃, 95% RH, DC100V case to terminal, 500 hours
Thermal Shock	ΔR±[2%+0.05Ω]	Power rating 30 minutes, -25℃ 15 minutes
Vibration	ΔR±[1%+0.05Ω]	10Hz~55Hz~10Hz (1 minute), 2 hours each direction
Moisture Load Life	ΔR±[3%+0.05Ω]	40℃, 95%RH, 0.1 x Power rating 1.5 hours on, 30 minutes off, 500 hours
Load Life	ΔR±[5%+0.05Ω]	Power rating 1.5 hours on, 30 minutes off, 500 hours

■ DIMENSIONS [mm]

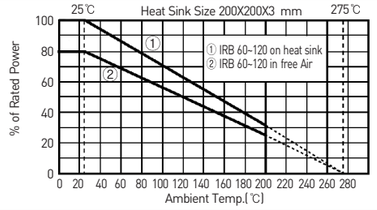
Model	Dimensions [mm]					
	L1	L2	D	W	L3	H
IRB 60	100±1.5	90±1	5±0.2	32.3±0.5	75±1	12.3±1
IRB 80	150±2	140±2	4.2±0.5	34±1	130±2	20±1
IRB 120	182±1	170±1	5±0.2	44±1	150±1	13±0.5



■ SURFACE TEMPERATURE INCREASE CURVES



■ DERATING CURVES



■ ORDERING PROCEDURE EXAMPLE

IRB60	50Ω	J
Model #	Resistance	Tolerance

Non-Flammable Wire Wound Fixed Resistors

GENERAL SPECIFICATIONS

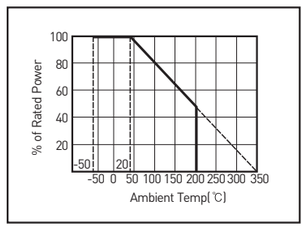
Model	Power Rating[W]	Resistance Range[Ω] Standard	Resistance Range[Ω] S Type	Tolerance (%)
KH KHIS KZG	15	1~15K	3K	1Ω ≤ R : J [±5] 1Ω > R :K [±10]
	20	1~20K	4K	
	30	1.5~30K	4K	
	40	2~40K	6K	
	50	2~50K	8K	
	60	1.5~60K	12K	
	80	2~80K	15K	
	100	2.5~100K	20K	
	120	3~120K	25K	
	150	4~150K	30K	
	200	5~200K	40K	
	300	8~200K	60K	
	400	10~300K	80K	
	500	10~400K	90K	
	600	10~500K	100K	
	700	10~600K	110K	
	1000	10~900K	120K	
	1200	10~1000K	130K	
	1500	10~1100K	140K	
	2000	10~1200K	150K	

CHARACTERISTICS

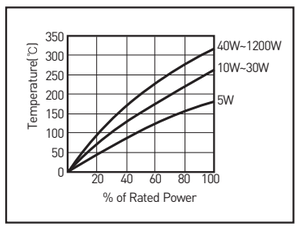
Temp. Coefficient		±200ppm/℃ maximum
Power Rating Load	ΔR/R≤±[1%+0.05Ω]	(JIS-C-5202, 5-4) 350℃ maximum
Short time Overload	ΔR/R≤±[2%+0.05Ω]	1000% rated power 5 secs.
Insulation Resistance		100MΩ minimum DC 500V
Dielectric Withstanding Voltage		KH: AC 1500V 1 minutes, KZG: AC 3000V 1 minutes.
Terminal Strength		5~20W: 4.5kgf, H20~40W: 6kgf, 60~200W: 8kgf, 300~400W: 10kgf - 30secs.
Resistors Strength		5W~40W: 20kgf, 60W~400W: 30kgf - 30secs.
Vibration		Mount: KZG 1.5mm 10~55Hz/1min. X,Y,Z 2 hours.
Solderability	75% coverage MIN.	270℃ 5 secs.
Heat Resistance		350℃ 2 hours
Thermal Shock	ΔR/R≤±[2%+0.05Ω]	Power rating load-30minutes, -55℃-15 minutes
Humidity (Steady State)	ΔR/R≤±[2%+0.05Ω], 10MΩ minimum	40℃, 95%RH, DC100V 500 hours
Moisture Load Life	ΔR/R≤±[2%+0.05Ω]	0.1×Power rating, 90minutes on, 30 minutes off, 40℃, 95% RH, 500 hours
Load Life	ΔR/R≤±[5%+0.05Ω]	Power rating, 90 minutes on , 30 minutes off, 500 hours
Flame Retardant	no evidence of flaming or arcing	100%~600% rated power load

NOTE : Applied voltage : AC RMS voltage

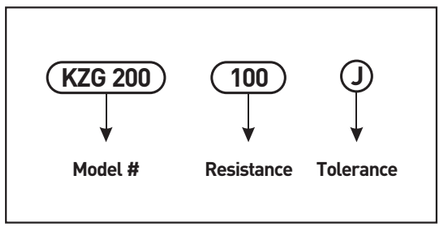
DERATING CURVE



TEMPERATURE RISE DATA



ORDERING PROCEDURE



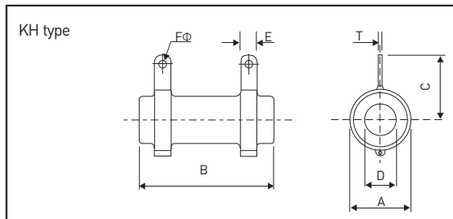
SHORT TIME OVERLOAD RATING

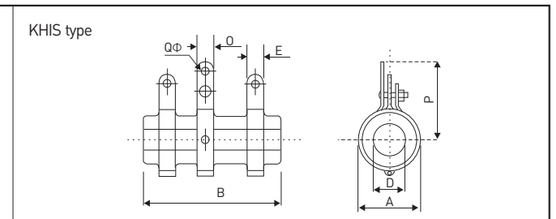
Load time(sec)	1	2	3	4	5	10	30	60	180	300	600	900
Max. Rated Load(%)	2600	2000	1600	1400	1300	1000	600	450	200	150	120	110

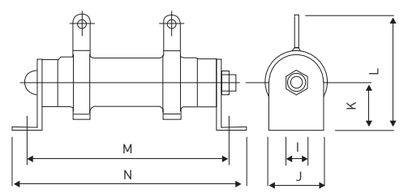
When loading for a short time with a cycle of over 30 minutes, the load can be more than the rated power.
To avoid short circuits between cables, do not exceed the maximum capable voltage between terminals.

K series

DIMENSIONS [mm]







Model	Power Rating[W]	Dimensions [mm] ±2 A	B	C	D	E	F	I	J	K	L	M	N	P	Q	O	T
KH KHIS KZG	15	17	50	20	8.5	5	2.8	4.2	18	22	41	71	86	26	3.5	6	0.5
	20	17	50	20	8.5	5	2.8	4.2	18	22	41	71	86	26	3.5	6	0.5
	30	17	75	20	8.5	5	2.8	4.2	18	22	41	99	110	26	3.5	6	0.5
	40	17	90	20	8.5	5	2.8	4.2	18	22	41	115	124	26	3.5	6	0.5
	50	28	75	33	14	8	4	6	26	30	62	110	133	35	4.2	8.5	1.4
	60	28	90	33	14	8	4	6	26	30	62	128	148	35	4.2	8.5	1.4
	80	28	115	33	14	8	4	6	26	30	62	150	173	35	4.2	8.5	1.4
	100	28	140	33	14	8	4	6	26	30	62	175	198	35	4.2	8.5	1.4
	120	28	165	33	14	8	4	6	26	30	62	200	221	35	4.2	8.5	1.4
	150	28	195	33	14	8	4	6	26	30	62	230	253	35	4.2	8.5	1.4
	200	28	254	33	14	8	4	6	26	30	62	290	313	35	4.2	8.5	1.4
	300	42	254	45	24	12	5.5	6.5	40	40	86	300	330	52	5	12	1.6
	400	42	330	45	24	12	5.5	6.5	40	40	86	380	407	52	5	12	1.6
	500	52	330	57	29	15	9	6.5	54	41	99	345	362	53	5	12	2.2
	600	52	330	57	29	15	9	6.5	54	41	99	375	392	53	5	12	2.2
	700	65	330	65	46	20	10	10	65	59	126	385	404	72	10	20	2.2
	1000	77	330	71	47	20	10	10	75	63	130	388	408	80	10	20	2.2
	1200	77	380	71	47	20	10	10	75	63	130	388	408	80	10	20	2.2
	1500	77	400	71	47	20	10	10	75	63	130	458	478	80	10	20	2.2
	2000	77	500	71	47	20	10	10	75	63	130	558	578	80	10	20	2.2

PERCENTAGE POWER DECREASE IN GROUP COFIGURATIONS

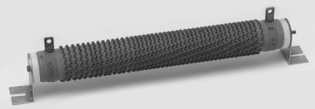
Interval	State	2EA	3EA	4EA	5EA	6EA	7EA	8EA	9EA	10EA	11EA	12EA
40mm	Open	63	56	51	48	45	43	40	38	36	34	32
	Close	54	47	43	41	38	36	34	32	31	29	27
45mm	Open	70	64	60	56	53	50	48	46	44	42	40
	Close	60	54	51	47	45	42	41	39	37	36	34
50mm	Open	73	68	64	60	58	56	55	54	52	50	49
	Close	62	58	54	51	49	47	46	45	44	43	42
55mm	Open	77	70	67	64	63	60	59	58	57	56	56
	Close	65	59	57	54	53	51	50	49	48	47	47
75mm	Open	82	76	72	68	66	65	64	63	62	61	60
	Close	70	64	61	58	56	55	54	53	52	51	50

RoHS COMPLIANT

Non-Flammable Wire Wound Fixed Resistors

GENERAL SPECIFICATIONS

Model		Power Rating[W]	Resistance Range[Ω]	Weight[g]	Tolerance (%)
KR KRIB KRZG	80	120	0.02 ~ 4	40	K (±10)
	100	150	0.03 ~ 5	170	
	120	180	0.03 ~ 6	200	
	150	225	0.04 ~ 8	250	
	200	300	0.05 ~ 10	306	
	300	450	0.08 ~ 15	650	
	400	600	0.10 ~ 20	800	



CHARACTERISTICS

Power Rating Load	[ΔR/R≤±1%]	(JIS-C-5202, 5-4) 375℃ maximum
Insulation Resistance		100MΩ minimum DC 500V
Dielectric Withstanding Voltage		KR, KRG: AC 2000V 1 minutes, KRZG: AC 3000V 1 minutes
Temp. Coefficient		±400ppm/℃ maximum
Short Time Overload	[ΔR/R≤±2%]	300% rated power 5 sec.
Moisture Resistance (Steady state)	[ΔR/R≤±2%, 10MΩ minimum]	40℃, 95%RH, DC100V case to terminal, 500 hours
Thermal Shock	[ΔR/R≤±2%]	Power rating load-30min., -55℃-15minutes
Vibration		Mount: KRZG 1.5mm 10~55Hz/1min. X,Y,Z 2 hours
Heat Resistance		375℃ 2 hours
Resistors Strength		30kgf 30 sec.
Terminal Strength		10mm: 20kgf 30secs, 16mm: 20kgf 30 sec.
Flame Retardancy		100~600% rated power load
Moisture Load Life	[ΔR/R≤±2%]	(10% rated power load) 90 minutes on, 30 minutes off, 40℃, 95% RH, 500 hours
Load Life	[ΔR/R≤±5%]	(100% rated power load) 90 minutes on, 30 minutes off, 500 hours

SHORT TIME OVER LOAD RATING

	An overload exceeding the nominal current is allowed for a short time of 30 minutes or less.								
Load time(sec)	5	10	30	60	180	300	600	900	1800
Max. Amps Rated Load	400%	350%	250%	200%	140%	120%	110%	105%	100%

NEMA STANDARD/ ON-OFF CYCLING

Cycling Time (secs)	5 secs ON 75 secs OFF	10 secs ON 70 secs OFF	15 secs ON 75 secs OFF	15 secs ON 45 secs OFF	15 secs ON 30 secs OFF	15 secs ON 15 secs OFF
Max. Amps Rated Load	290%	215%	185%	160%	150%	125%

*NEMA (National Electric Manufacturers' Association)

CURRENT REDUCTION RATE (%) FOR GROUPED APPLICATIONS

EA	2	3	4	6	9	12	16
%	84	80	78	76	75	73	71

ORDERING PROCEDURE

KR 100 — 0.102Ω — K

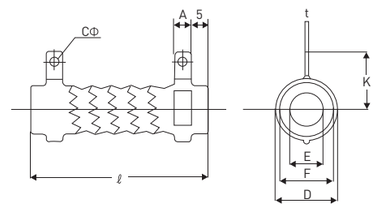
Model # — Resistance — Tolerance

KR series

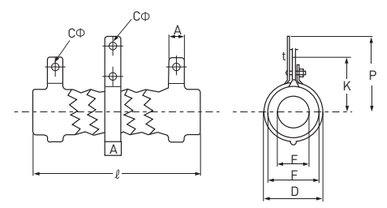
RoHS COMPLIANT

DIMENSIONS [mm]

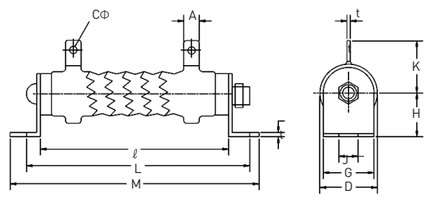
KR type



KRIB type

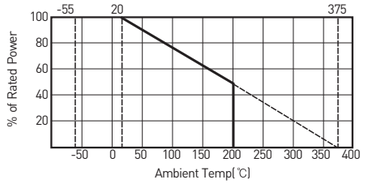


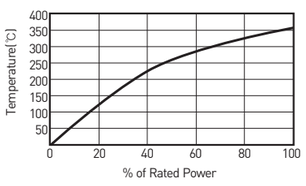
KRZG type



Model	Shape	Dimensions [mm] ±2													
		A	C	D	E	F	G	H	J	K	ℓ	I	M	P	t
KR KRIB KRZG	80	8	4	28	14	26	26	30	6	33	115	150	173	35	1.4
	100	8	4	28	14	26	26	30	6	33	140	175	198	35	1.4
	120	8	4	28	14	26	26	30	6	33	165	200	221	35	1.4
	150	8	4	28	14	26	26	30	6	33	195	230	253	35	1.4
	200	8	4	28	14	26	26	30	6	33	254	290	313	35	1.4
	300	12	5.5	42	24	40	40	40	6.5	45	254	300	330	52	1.6
	400	12	5.5	42	24	40	40	40	6.5	45	330	380	407	52	1.6

DERATING CURVE AND TEMPERATURE RISE DATA





STANDARD RESISTANCE VALUES AND MAXIMUM CURRENT

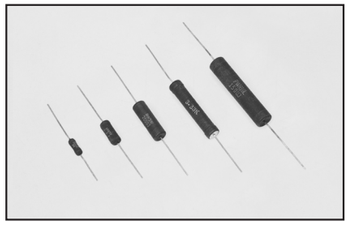
Model \ Ohm	0.02	0.03	0.04	0.05	0.06	0.08	0.1	0.15	0.2	0.25	0.3	0.4	0.5	0.6
K-80	77A	63	55	50	45	39	35	28	25	22	20	17	15	14
K-100		71A	61	55	50	43	39	32	27	25	22	19	17	16
K-120		78A	67	60	55	48	43	35	30	27	24	21	19	18
K-150			75A	67A	61	53	47	39	33	30	27	24	21	19
K-200				77A	71	61	55	45	39	35	32	27	24	22
K-300						75A	67	55	47	42	39	33	30	27
K-400							77A	63	55	49	45	39	35	31

Model \ Ohm	0.8	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	8.0	10.0	12.0	15.0	20.0
K-80	12A	11	9	7.8	6.9	6.3	5.5							
K-100	14A	12	10	8.6	7.8	7.1	6.1	5.5						
K-120	15A	13	11	9.5	8.5	7.8	6.7	6.0	5.5					
K-150	17A	15	12	11	9.5	8.7	7.5	6.7	6.1	5.3				
K-200	19A	17	14	12	11	10	8.6	7.7	7.1	6.1	5.5			
K-300	24A	21	17	15	13.5	12	10	9.5	8.6	7.5	6.7	6.1	5.5	
K-400	27A	24	20	17	15.5	14	12	11	10	8.7	7.7	7.0	6.3	5.5

RoHS COMPLIANT

Precision Wirewound Resistors

- Complete Welded Construction
- Wide Resitance Range: 0.1Ω~100KΩ
- Tolerance from 0.05%
- Available on Tape: 1W to 10W
- High Temperature Resistent Silicone Coating
- Available in Non-Inductive Style (Type N)
- Special Matching Available (T.C.R and Tolerance)



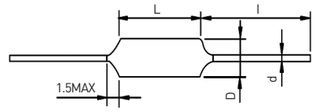
GENERAL SPECIFICATIONS

Model	Power Rating[W]	Max. Working Voltage[V]	Resistance Range[Ω]		Tolerance (%)
			W*	N**	
PWR 0.5	0.5	20	0.1 ~ 3K	0.1 ~ 1.5K	A [±0.05]
PWR 1	1	50	0.1 ~ 8K	0.1 ~ 3K	B [±0.1]
PWR 2	2	100	0.1 ~ 10K	0.1 ~ 4K	C [±0.25]
PWR 3	3	200	0.1 ~ 18K	0.1 ~ 9K	D [±0.5]
PWR 5	5	400	0.1 ~ 35K	0.1 ~ 17K	F [±1]
PWR 7	7	450	0.1 ~ 50K	0.1 ~ 25K	G [±2]
PWR 10S	10	700	0.1 ~ 70K	0.1 ~ 35K	
PWR 10L	10	800	0.1 ~ 100K	0.1 ~ 50K	

W*: Inductive, N**: Non-inductive

DIMENSIONS [mm]

Model	Dimensions [mm]			
	D±0.8	L±1.5	d±0.02	l±3
PWR 0.5	3.30	10.0	0.7	37
PWR 1	4.00	12.0	0.8	37
PWR 2	4.70	13.8	0.8	35
PWR 3	5.90	15.7	0.8	35
PWR 5	8.52	22.5	0.8 / 1.0	44 / 35
PWR 7	8.52	24.5	0.8 / 1.0	44 / 35
PWR 10S	8.52	39.2	0.8 / 1.0	35
PWR 10L	10.5	46.2	0.8 / 1.0	33

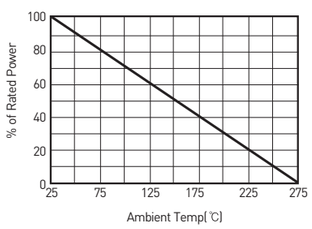


CHARACTERISTICS

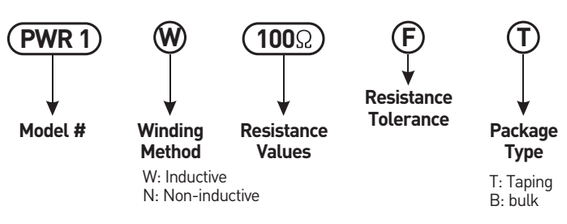
Insulation Resistance	1GΩ min. dry.	DC500V, 1 minimum
Dielectric Withstanding Voltage	±[0.1%+0.05Ω]ΔR	500VAC, 1 minimum
Temp. Coefficient		~0.99Ω: ±90ppm/℃ 1~9.9Ω: ±50ppm/℃ 10Ω~: ±20ppm/c
Short Time Overload	±[0.2%+0.05Ω]ΔR	1W-3W: 5 Times rated power for 5 sec. 5W-10W: 10 Times rated power for 5 sec.
Thermal Shock	±[0.2%+0.05Ω]ΔR	-65 ℃(30min.), 25 ℃, 150 ℃ (30min.), 25 ℃, 5cycle
Low Temp. Storage	±[0.2%+0.05Ω]ΔR	-65℃ for 24 hours
High Temp. Exposure	±[0.5%+0.05Ω]ΔR	275℃ for 2 hours
Terminal Strength	±[0.1%+0.05Ω]ΔR	4.5kg for 10 sec.
Solderability	95% coverage minimum	230℃ for 5 sec.
Load Life	±[0.5%+0.05Ω]ΔR	Power Rating 90minutes on, 30minutes off, 2000 hours

*NOTE : Applied voltage : AC RMS voltage

DERATING CURVE

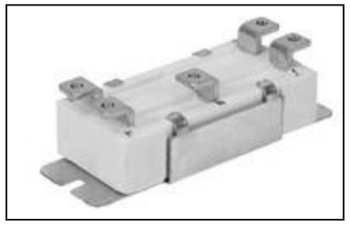


ORDERING PROCEDURE EXAMPLE



RQL50 Network Resistors

The RQL 50 network resistor is an extremely low price model comprising up to 4 elements in one housing. They are easy to install and made from durable cement. The most common applications for theses components are PCB boards and networks.

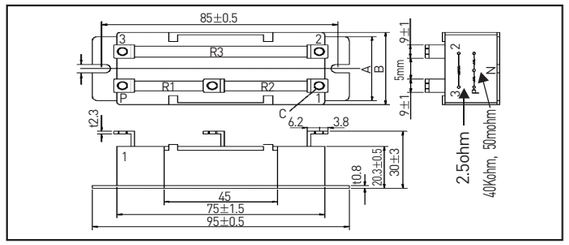


GENERAL SPECIFICATIONS

Model	Rated Power	Resistance Range[Ω]	Tolerance(%)
RQL50	R1:5	R1:40K	J [±5]
	R2:10W	R2:50m	
	R3:25W	R3:2.5	

DIMENSIONS [mm]

Model	Dimensions [mm]		
	A±1	B±1	C
RQL50	30	35.3	5-M4 Tab



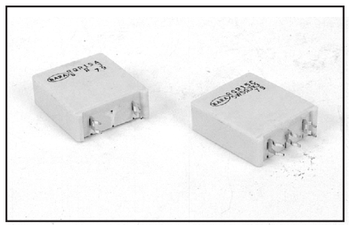
CHARACTERISTICS

Values in [ ] mean change in Ω after test

Temperature Range	-25℃ ~ 155℃
Insulation Resistance	20MΩ minimum
Dielectric Withstanding Voltage	AC2000V 1minute
Temp. Coefficient	±260 ppm/℃

RQR15, RQR20 Ceramic Encased Resistors

The RQR15 network resistors are cement encased components comprising three resistors in one. They have a low cost and are extremely easy to install. The main applications for these are PCB boards and networks.

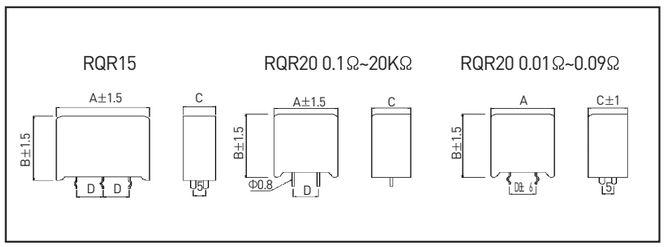


GENERAL SPECIFICATIONS

Model	Rated Power	Resistance Range[Ω]	Tolerance (%)	
RQR 15A	30W	0.01 ~ 30	D [±0.5] F [±1], G [±2] J [±5], K [±10]	RQR15C Type
	15W	31 ~ 54K		
RQR 15C	5W×3	0.01 ~ 18K		RQR 15A Type
RQR 20	20W	0.01 ~ 20K		

DIMENSIONS [mm]

Model	Dimensions [mm]			
	A±1.5	B±1.5	C±1	D±0.6
RQR15	33	38	12	9.5
RQR20	22.5	37.5	14	9



CHARACTERISTICS

Values in [ ] mean change in Ω after test

Temperature Range	-25℃ ~ 155℃
Insulation Resistance	20MΩ minimum
Dielectric Withstanding Voltage	AC2000V 1minute
Temp. Coefficient	± 260 ppm/℃